# WaterPLUS

## (Point-of-use LED Ultraviolet System)


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# EXECUTIVE SUMMARY

**Business Overview**

Waterborne pathogens are among the leading causes of disease in the developing world, resulting in four billion clinical episodes of diarrhea and three million deaths per year, of which 88% (3.5 billion cases and 2.6 million deaths) are due to unsafe drinking water (World Health Organization, World Health Report 2004). Water-borne diseases represent 20% of the total mortality in children under five in developing countries, and an estimated 94% of this burden is preventable. In addition to contaminated water sources, contamination of drinking water frequently occurs at the household level due to inadequate infrastructure, unsanitary conditions, and unsafe water storage practices. Thus, point-of-use (POU) devices, which require the least capital and maintenance and can address the health burden of contaminated water used for drinking, cooking, and basic hygiene, are ideal for developing communities. Our vision is to create a water purifier employing recently developed UV-LEDs which, when compared to other UV radiation technologies, are potentially cheaper, require less energy, consume less space, longer lasting, and are less toxic to the environment when retired.

**The Market**

- 1.1 billion people lack access to safe drinking water (220 million households, averaging 5 persons/house)
- UN Millennium Development Goals aim to reduce by half people without access to safe water by 2015
- USAID plans to leverage $1.6 billion in partnership with private industry over the next few years

**Market Solution**

Water purification by ultraviolet light is an optimal choice for the following reasons:

- It permanently disrupts the DNA of microorganisms and is effective against viruses and parasites that are resistant to other disinfection technologies. It is fast acting, needing seconds instead of minutes to work.
- It creates no byproducts in the water, thus avoiding the production of potential human carcinogens and disagreeable tastes in water that results through chemical purification.
- It only requires electricity to operate and avoids problems of chemical purification approaches that demand a local inventory and delivery system for chemicals.

Traditional mercury-arc UV lamps have a lifetime of 10,000 hours (about 1 year of use), cost between $12 and $60, require a minimum of forty watts to operate, and pose significant environmental risks when improperly disposed due to mercury vapor. UV-LEDs, in contrast, have a projected lifetime of 100,000 hours (about 10 years of use), require under a watt of power to operate, are extremely robust, and pose no environmental risks in disposal. Our low-cost, point-of-use UV purifier consists of four components: UV-LED light source, LED and power circuitry, a flow tube with pre-filter, and a power source. Furthermore, our purifier can utilize different sources of electricity: pull-cords, photovoltaics, or DC transformers where applicable.

**Marketing and Sales Plan**

Our ultimate market is the 220 million households lacking access to safe water, while the rapidly growing middle to high income households in developing countries will serve as an initial market to bootstrap future operations. We will reach our market through established distribution channels (household goods producers, multilateral institutions, NGOs, and governments) and directly through contracted social marketing. Our focus is to develop and manufacture an appropriate, affordable technology. We believe we can achieve in the long run an end price to the consumer of less than $50 per unit, with the vision of ultimately reaching a price at or below $20.

**Risk Assessment**

Our largest risk lies in competitive technology. At this point in time and to our knowledge, WaterPLUS is the only team developing a purifying device based on UV-LEDs for low-income communities.

**Operations Timeline**

Phase 1 – Jan 2008, Venture formation, garnering funds, technology evaluation, prototype development

Phase 2 – Jan 2009, Begin community intervention trials measuring diarrheal outcomes, optimize product

Phase 3 – Jan 2010, Launch product roll-out in Dhaka, Bangladesh and later in Kampala, Uganda

Phase 4 – Jan 2011, Launch four new distribution sites in surrounding areas

**Management Team**

- Naman Shah is a M.D./Ph.D. student at the University of North Carolina.
- Saket Vora is pursuing an M.S. in electrical engineering at Stanford University.
- Joel Thomas serves as executive director of the social enterprise Nourish International.
- J.E. (Win) Bassett IV is a law student at the University of North Carolina.
- Kari Leech is pursuing an M.S. in environmental engineering at the University of North Carolina.

- Will Patrick is pursuing a B.S. in mechanical engineering at Duke University.

**Financials**

Prototype development will cost approximately $12,000 during Phase 1. Field trials in Phase 2 are estimated to require $75,000 for implementation and follow-up. Depending on the results from the field trials, the post-trial development in order to address concerns and further optimize for manufacturability is expected to cost between $10,000 and $20,000. Including appropriate operating overhead during these initial phases, WaterPLUS would approximately need capital of $140,000 to bring our product to market. Under a self-sustaining model with zero subsidies, WaterPLUS expects a break-even point in the five to seven year timeframe.