



Photo Credit: ASEI

The ASEI team with the Deputy Head Teacher of Kaihura Parents Secondary School

HYDRO HEROES: ASEI'S SOLAR-POWERED PURE WATER SOLUTION

From Challenge to change

Access to water is a fundamental human right, yet one in four people worldwide, totalling 2.2 billion, lack access to safe, clean drinking water¹.

The crisis is acute in Uganda, where 40% of the population (19 million people) face water insecurity². This leads to the spread of water-borne diseases, such as cholera and diarrhoea, severely affecting low-income communities and refugee settlements. Uganda currently hosts approximately 1.6 million refugees³.

Rural areas often lack access to centralised water treatment systems, forcing communities to rely on inefficient and costly methods, like boiling, or solar water disinfection (SODIS) to purify water. There is an urgent need for improved point-of-use drinking water disinfection technologies.

In 2020, students from Gulu University, Uganda, entered the [Efficiency for Access Design Challenge](#) with aspirations to address this need. Their innovative solution is a [decentralised point-of-use solar ultraviolet-C \(UVC\) water disinfection system](#), using solar-powered ultraviolet LEDs (UV-LEDs) to make water safe for drinking.

Designed to be cost-effective and sustainable, their design impressed judges, earning them a Bronze Award in the Challenge. Empowered by this success they developed their design into a living prototype, and founded the [African STEM Education Initiative \(ASEI\)](#) to further their mission. The main aims were to provide access to safe drinking water in refugee settlements and off-grid communities, and support youth and community STEM education towards increased technology access.

A deep dive with ASEI

Alicwamu Moses, a founding member of ASEI, shared insights into their projects addressing water and energy access in Uganda. Moses reflected on the team's participation in the Efficiency for Access Design Challenge, and discussed their plans for future innovation and collaboration.

Can you provide a brief background to ASEI, and the problems you are trying to solve?

ASEI is a science and technology social enterprise located in Fort Portal, Uganda.

Through research, innovation and enterprise, ASEI aims to promote transformative technology and build the capacity for it to be used in underserved education, clean energy and water markets.

Building capacity through education and bringing technology within reach of the people that need it most, form a core part of our methodology.

Recently, our focus has been on finding solutions to three separate but urgent issues, which are limited access to safe drinking water, limited access to affordable clean cooking devices, and digital access and connectivity in Uganda.

Reflecting on your participation in the Efficiency for Access Design Challenge, what were the most significant benefits and insights gained that have propelled ASEI's mission forward?

The most significant benefit was learning how to design for the end-user. This involves putting the end-user at the centre of everything before determining technology, features, price and business model.

User-centred design has formed a core component of all the work we do at ASEI, and we see it as an engine for achieving growth and delivering tangible impact.

Photo Credit: ASEI



Alicwamu Moses (third from the left, back) with the Humanitarian Engineering students at UNSW, Sydney, Australia

Could you share some key updates and achievements at ASEI in the years following your participation in the Challenge?

ASEI has developed its water programme around the Challenge project on point-of-use solar-powered UV-C water purification. Since the Challenge, we have installed systems that are providing safe drinking water to over 2,500 people in schools and healthcare centres. We have further formed key partnerships with industry and research universities like the University of New South Wales (UNSW) in Australia, and have attracted funding from universities, NGOs and development partners to pilot our design.

What innovative solutions has ASEI developed to advance affordable and clean energy access, contributing to the attainment of Sustainable Development Goal 7 (SDG 7)?

The solutions include a water disinfection system, which we developed through the Challenge and beyond, and we also went on to develop an Insulated Solar Electric Cooker. Both use solar direct current-powered devices to enable purification of drinking water at the point-of-use, and enable clean cooking for households respectively, therefore directly contributing to improving people's lives.

In addition to SDG 7, are there other Sustainable Development Goals in Sub-Saharan Africa that ASEI is actively working to advance?

Education of communities and young people in schools is a vital part of what we do. We believe there is a huge knowledge gap amongst communities on potential problems or risks they are exposed to, what technological solutions can mitigate those risks, and how best to acquire and use such technologies.

ASEI has been working with schools to advance knowledge of science and technology through problem-based learning. Learners have participated in project work involving clean energy access, water access and digitalisation through coding. Therefore, we are advancing SDGs through tackling quality education, access to safe water, reduced inequalities, gender equality, industry innovation and infrastructure, decent work and economic growth, and partnerships for the goals.

Could you elaborate on the various partnerships and collaborations that ASEI has forged with businesses, universities, or other organisations?

We have partnerships with universities and manufacturers working in the water disinfection and solar energy space in Australia, Japan, Malawi, Uganda and the USA. More broadly, industry partners provide knowledge and experience of possible applications, designs, and price points while universities contribute to our research and education component. University students intern with us and bring in new ideas and cover some human resource gaps.

Based on your experience, what words of advice or encouragement would you offer to students and universities considering participation in the Efficiency for Access Design Challenge?

There is one simple piece of advice,
"Participate in the Efficiency for Access Design Challenge".

As a student in Uganda, the Challenge gave me an opportunity to connect with a global community of students, academics and industry professionals. This boosted my confidence and helped me develop my awareness of global challenges. One of ASEI's university collaborations in the UK was through a student I met during the Challenge. Every student deserves such an opportunity to create a specific industry network, which can change their career prospects forever.

Could you share ASEI's future plans and ambitions, as well as the most significant challenges you anticipate facing as you continue your journey in clean energy access innovation?

Our everyday challenge is to scale our product and service offerings because we have proof of concept for the work we do. The plan is to bridge the drinking water access gap through decentralised solar-powered micro-factories, in which people living in small off-grid trading centres and urban slums can access safe, clean drinking water at affordable prices. Further, micro factories have the potential to redefine how water is generated and consumed within residential and hotel market segments.

Similarly, ASEI hopes to establish a supply chain for solar electric cooking in addition to expanding its science and technology education offerings to more schools and communities to promote the use and adoption of sustainable technology.

The biggest challenge will be navigating the social and cultural expectations around how people acquire and use technology.

Accelerating safe water access

Recognising the growing demand for clean water in Uganda, ASEI identified the market potential to scale up operations. In 2023, they applied to the Efficiency for Access Design Challenge Accelerator Programme, seeking support to refine their technical capacity, business model, and financing strategies. The Accelerator Programme, delivered in partnership with Energy Catalyst, will provide expert business advice for them, propelling their prospects and advancing their mission to expand access to safe drinking water in off-grid communities across Uganda.

The Efficiency for Access Design Challenge and Accelerator Programme is funded by UK aid, from the UK government via the Transforming Energy Access platform and the IKEA Foundation.



Photo Credit: ASEI

Students at Kaihura Secondary School accessing drinking water through the water purification system designed by ASEI

- <https://www.who.int/news-room/fact-sheets/detail/drinking-water>
- <https://www.wateraid.org/where-we-work/uganda>
- <https://reporting.unhcr.org/uganda-population-dashboard-7627>