



engineeringworldhealth

Annual Report
October 2021 - September 2022



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LETTER FROM THE BOARD CHAIR AND CEO

Dear Friends of Engineering World Health,

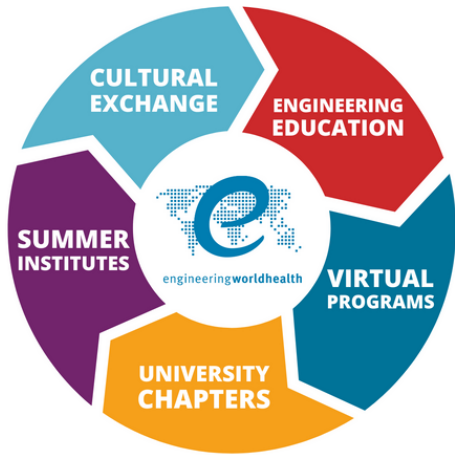
2022 was an exciting year for EWH; after a two-year hiatus on in-person programs due to the COVID-19 pandemic, we ran four Summer Institutes with full enrollment in the [Dominican Republic](#), [Guatemala](#), [Rwanda](#), and [Nepal](#). 68 volunteers repaired 651 pieces of medical equipment in 29 partner hospitals - **their work and repairs are worth an estimated \$1.3 million dollars invested in improving healthcare delivery around the world.**

We're thrilled to be back on the ground working with talented young engineers while providing critical services to hospitals in need. Find more information about the accomplishments of our 2022 Summer Institutes and plans for 2023 Summer Institutes in Guatemala, Uganda, and Nepal in this report and on [our website](#). Thank you for your continued support of this critical work!

In addition to executing a successful return to Summer Institutes, in 2022 our small but mighty team facilitated **exceptional learning and service opportunities for engineers of all ages through virtual programs, university chapters, and STEM outreach initiatives.** We supported 737 students in under-resourced K-12 schools in the US and abroad through free [engineering education kits](#), facilitated 6 [virtual programs](#) for more than 300 participants in 7 countries, and connected with over 400 university students through 30 [EWH Chapters](#) around the world. In addition to hosting a successful [college design competition](#) for the 13th year in a row, our first-ever [design competition for high school students](#) was met with enthusiasm from talented students from around the country.

Throughout 2023, we are continuing our work in each of these five strategic focus areas:

- **[Summer & January Institutes](#)** | EWH's Institutes are service abroad opportunities for university students and young professionals in STEM fields. During these programs, participants receive intensive technical training before being placed in hospitals in low-resource areas of Central America, Southeast Asia, and East and West Africa to serve as volunteer biomedical equipment technicians. Participants collaborate with local hospital staff to repair medical equipment and improve the facilities' overall healthcare technology situation while simultaneously honing their engineering skills and immersing themselves in a new culture.
- **[University Chapters](#)** | Our Chapters provide students with a unique opportunity to learn and connect with the global biomedical engineering community. Chapters have designed and implemented STEM outreach programs in their local communities, participated in EWH and international design competitions, launched hackathons and campus-wide designathons, hosted fundraising galas, planned their own hospital outreach campaigns and much more.



- **Engineering Education** | EWH's Biomedical Instrumentation Kits provide students with hands-on opportunities to engage with key engineering concepts and connect what they learn with practical biomedical applications. Our growing BMET Library provides free access to resources for the repair and maintenance of vital medical equipment to thousands of users around the world each year.

- **Virtual Programs** | Virtual programs enable EWH to reach more students than ever before with high-quality engineering education opportunities. EWH now offers multiple virtual exchange opportunities for high school and university students to collaborate on international teams to innovate solutions to real global health challenges.
- **Cultural Exchange** | Fostering cultural exchange is at the core of our work. Each EWH program includes important lessons in cultural awareness to better prepare students for international work and collaboration and ensure that students are getting the most out of each experience.

As always, and more than ever, we are so grateful for your continued support of our work. Your investment in the next generation of engineers and healthcare professionals is more important than ever. Together, we can inspire, educate, and empower students and professionals around the world to make strides in improving healthcare delivery across the globe. *Thank you!*



Tojan B. Rahhal Ph.D., LL.M
President & CEO



Michael R. Tracey, Ph.D.
Board Chair

OUR MISSION

Our mission is "to inspire, educate, and empower the biomedical engineering community to improve healthcare delivery around the world."

Many hospitals around the world rely on donated medical equipment to treat patients. Unfortunately, much of this potentially life-saving equipment arrives unusable in the local environment, and over time, nearly all of it falls out of service.

When medical equipment breaks down in low-resource countries, it often stays broken. There are usually few supply chains to get replacement parts, and local technical expertise is sparse. Hospitals face large challenges accessing skilled technicians who can install, repair, and maintain this critical equipment. Infant incubators, oxygen concentrators, and patient monitors lay abandoned in equipment "graveyards."



OUR SOLUTION

EWH Summer Institutes provide intensive hands-on training to university students and young professionals in STEM fields and then place them in hospitals in low-resource areas of Central America, Southeast Asia, and East and West Africa to serve as volunteer biomedical equipment technicians.

Participants collaborate with local hospital staff to repair medical equipment and improve the facilities' overall healthcare technology situation, improving their ability to provide quality care to patients in need.

EWH was founded in 2001 with the goal of engaging university students in these hands-on service programs. 20 years later, through university chapters, STEM outreach initiatives, and virtual programs, EWH provides students of all ages from around the world with opportunities to **gain engineering skills while learning about - and improving - global health.**

SAVING EQUIPMENT IS SAVING LIVES



+1,300

VOLUNTEERS



+14,000

REPAIRS



+\$30 MILLION

VALUE

SINCE 2004

SUMMER + JANUARY INSTITUTES

After a two-year hiatus due to the COVID-19 pandemic, our 2022 Summer Institutes concluded successfully with overwhelmingly positive feedback from participants. From May through August, 68 volunteers traveled with Engineering World Health on programs to the Dominican Republic, Guatemala, Rwanda, and Nepal. Collectively, they repaired 651 pieces of equipment at 29 different partner hospitals.

We're excited to share final reports for each program, including more information about the student experience and details on their repairs and secondary projects. You can view the final reports here:

- **Dominican Republic** Campus to Country Institute with the University of Portland
- **Guatemala** Summer Institute
- **Rwanda** Summer Institute
- **Nepal** Campus to Country Institute with Denmark Technical University



68

VOLUNTEERS



651

REPAIRS



\$1.3 M

VALUE



One common theme among the feedback was that participants were surprised at what they were able to accomplish and the impact they had on their placement hospitals. One student remarked, "**My goal when I came here was to just fix at least one important machine, and we ended up repairing 45 devices.**" Another student shared how he saw the impact of his work firsthand - "My favorite fix was for an infant warmer which the nurses said got too hot for the babies... The very next day I saw them using it on a baby on a ventilator, so that moment was extremely real for me."

When asked to describe the program, students said it was "**unforgettable.**" One said, "The overall experience was very eye-opening and unlike any other experience I've ever had."

SUMMER + JANUARY INSTITUTES

THE LYNN TOBY FISHER SCHOLARSHIP FUND

Thanks to support from EWH's Lynn Toby Fisher Scholarship Fund, ten Rwandan students and five Guatemalan students were among this year's Summer Institute participants.

Lynn Toby Fisher was a brilliant, warm, and generous woman who was deeply committed to the values exemplified in Engineering World Health's work.

A member of EWH's Board of Directors from 2014 until her untimely death in 2020, Lynn was especially passionate about EWH's outreach to, and support of, engineering and science students from the countries in which Engineering World Health provides services. To support EWH in this mission, friends and family established the Lynn Toby Fisher Scholarship Fund.



15

HOST COUNTRY PARTICIPANTS



34

SCHOLARSHIPS AWARDED



"The most rewarding part was building a relationship with our technicians and Rwandan students, and being able to have a positive impact and ease their workload in the hospital."

In addition to support for fifteen host country students to participate in our 2022 Summer Institutes, thanks to support from our generous donors and funding partners, EWH was able to provide 34 international students with scholarship awards.

2023 INSTITUTES

In January 2023, eleven undergraduate students from the Rochester Institute of Technology traveled to Guatemala to spend 3 weeks serving hospitals around the country. Our 2023 open-enrollment Summer Institutes will be in Guatemala and Uganda, where EWH has a long history of successful programs. In July, students from the Nordic Five Tech will travel to Nepal for their annual Campus to Country Institute.



UNIVERSITY CHAPTERS

EWH University Chapters provide students with a unique opportunity to connect with a global network of biomedical engineers and other students who share their passion. EWH University Chapters have designed and implemented STEM outreach programs in their local communities, participated in EWH and international design competitions, launched hackathons and campus wide design-athons, hosted fundraising galas, planned their own hospital outreach campaigns and much more!

US CHAPTERS

University of Arkansas
Case Western Reserve University
Clemson University
University of Connecticut
University of California, San Diego
Cornell University
University of Colorado, Boulder

Duke University
Georgia Tech
University of Illinois, Chicago
University of Maryland
University of Minnesota, Twin Cities
Northern Illinois University
Purdue University

Rochester Institute of Technology
University of Rochester
University of Texas at Austin
Texas A&M University
Vanderbilt University
University of Vermont
Virginia Tech
Washington and Lee University

INTERNATIONAL CHAPTERS

Aalborg University | Denmark
Universidad Albert Einstein | Mexico
Chung Yuan Christian University | Taiwan
University College Dublin | Ireland
Technical University of Denmark
University of Ghana

Makerere University | Uganda
National Autonomous University of Mexico
University of Queensland | Australia
University of Science and Technology | Yemen
Pranveer Singh Institute Of Technology | India
University of Sydney | Australia

2022 CHAPTER OF THE YEAR

University College Dublin was named EWH Chapter of the Year for the second year in a row in 2022. Though their Chapter was only started in 2020, this outstanding group of 33 students exemplifies the goals of the EWH Chapter program. The UCD Chapter regularly hosts soldering workshops for its members and does STEM outreach to local youth centers and secondary schools. They host an annual EWH Ball social event, bring in guest speakers, and collaborate with other campus groups.

The UCD Chapter took third place in EWH's 13th annual Design Competition with Vit-A-Dapt, a low-cost portable adaptometer which can be used to screen for vitamin A deficiency in children and pregnant women. They also placed in the 2021 Nova UCD Student Enterprise Competition. This Summer, UCD Chapter member Sar traveled to Rwanda with EWH on our Summer Institute program. Read more about their achievements [here](#).



UNIVERSITY CHAPTERS | DESIGN COMPETITION

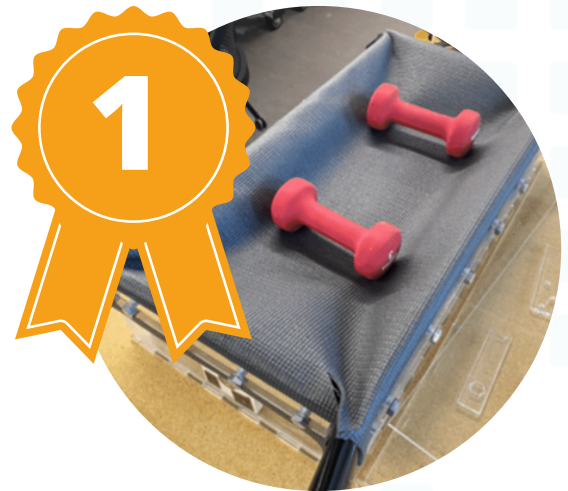
The EWH Design Competition invites EWH Chapters to submit innovative designs for medical technology that can make a difference in low-resource settings. This year, our judges reviewed 14 fantastic proposals from 10 universities across 4 countries.

1ST PLACE CORNELL UNIVERSITY

LMIC Calmer Device, for managing pain in infants in the neonatal intensive care unit

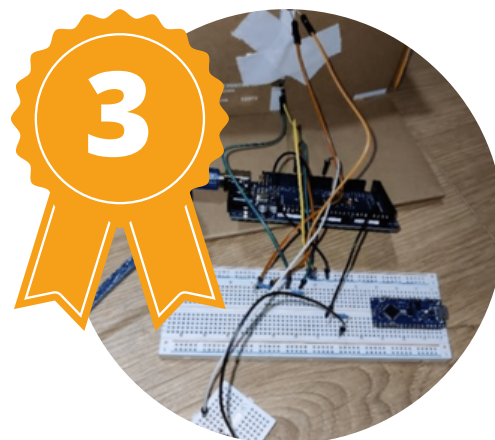
The Cornell EWH Chapter worked with Dr. Liisa Holsti to create a durable, low-cost version of her Calmer device, a complex medical instrument that simulates aspects of the Kangaroo Mother Care technique to manage premature infants' pain in the NICU. Clinical trials have found that the Calmer device provides the same level of pain management for premature infants as another human touch strategy called facilitated

tucking by replicating a heartbeat sound, using a skin-like surface, and mimicking a breathing motion. The current patented Calmer device costs around \$50,000, whereas the latest iteration of the LMIC Calmer can be produced for under \$300, making this technology much more accessible for healthcare providers in low- and middle- income countries.



DUKE UNIVERSITY

LowCostomy, a durable low-cost colostomy bag



UNIVERSITY COLLEGE DUBLIN

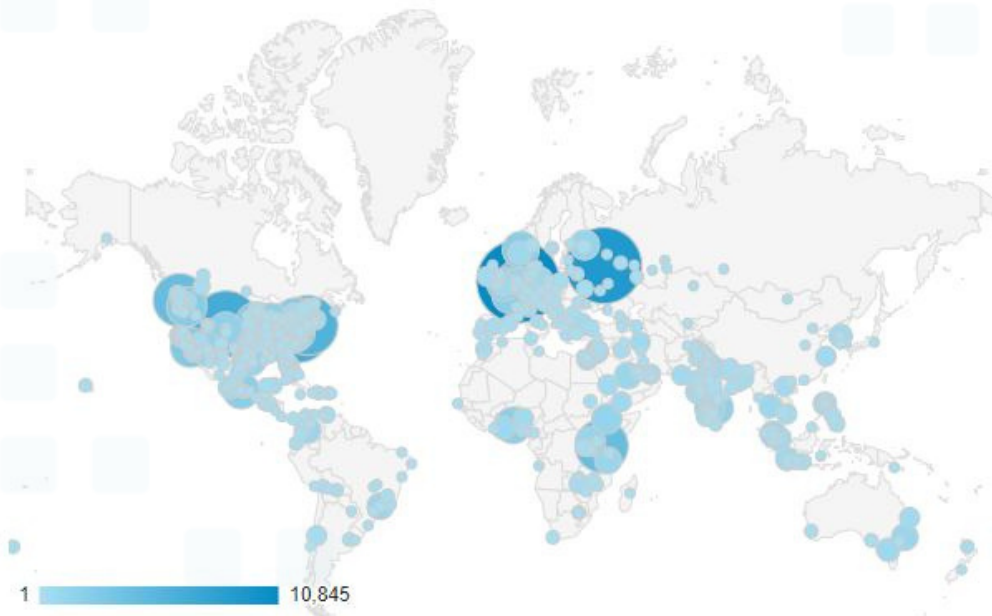
Vit-A-Dapt, a low-cost portable adaptometer

ENGINEERING EDUCATION | BMET LIBRARY

Through the BMET Library, Engineering World Health fosters information exchange among engineers and technicians around the world. We believe that a stronger biomedical community will lead to more equipment designed for a variety of environments, more people with advanced biomedical knowledge, and - ultimately - more hospitals with the technology they need to provide quality care.

Now in its seventh year, EWH's online, open-access [BMET Library](#) continues to be a critical resource for technicians and engineers around the globe. The Library hosts thousands of open-source books, training guides, equipment manuals, and other resources, primarily targeted toward supporting biomedical equipment technicians in low-resource environments. Use of this free resource rose significantly during the COVID-19 pandemic, growing from 1,700 users in 2019 to 5,982 users around the world in 2021 and 15,000 users in 2022.

BMET Library Use by Country



As part of our efforts to support BMETs, EWH has grown its collection of resources from just over 1,000 in 2019 to 3,200 in 2022, and is continuing to update the Library with approximately 50 new materials per month. In the next year, we aim to continue growing our expanding video and foreign language sections, which currently include items in Spanish and French.



Do you have resources that you think should be included in EWH's BMET Library?

Share them with us by emailing library@ewh.org

ENGINEERING EDUCATION | KITS FOR THE CLASSROOM

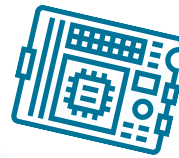
EWH's [Kits for the Classroom](#) program provides free, hands-on STEM education to **Title I K-12 schools** across the U.S. Our [three Kits](#) are based on biomedical devices and are designed to introduce students to **engineering and circuitry** through hands-on experience. Kits engage students in STEM learning, while the resources EWH provides emphasize the real-world applications of each lesson.

Thanks to support from EWH partners and donors, in 2022 we've provided free Kits and learning materials to eight Title 1 schools for use with over 700 students.

"The program as a whole was wonderful. The materials and lesson plans were excellent. They were well received and enjoyed by the students!"

In addition to parts to build the Kits, EWH provides each classroom with supplies and lesson materials, works with teachers to fit the activity into their curriculum, and even helps implement the activity by guiding students through virtual build sessions. Kit activities tie in scientific concepts such as light and color, the circulatory system, and physical health.

As part of our outreach efforts, in 2022, EWH hosted special virtual Kit build events with Atrium Health, NC State's Science House, and the Mayor's Youth Empowerment Program in Charlotte. Interested in using our Kits or hosting an event for your school or organization? [Get in touch!](#)



130

KITS



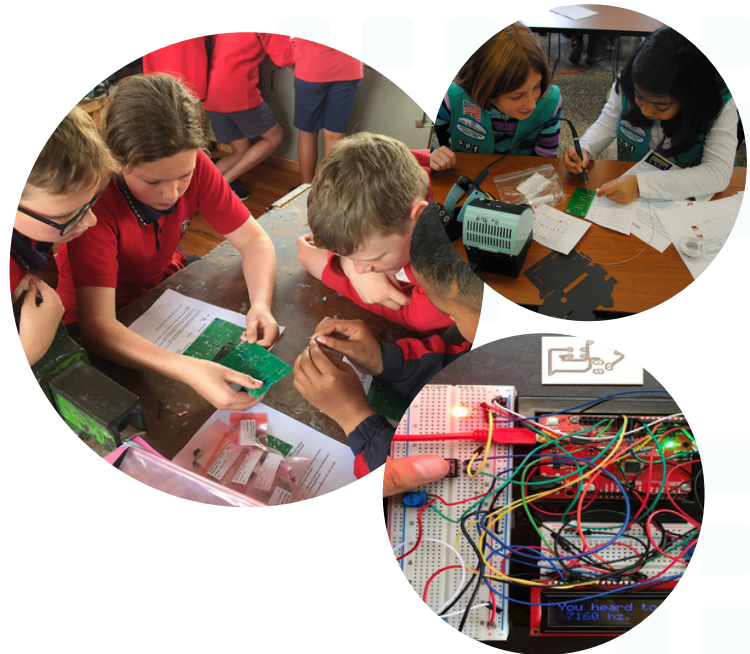
737

STUDENTS



8

SCHOOLS

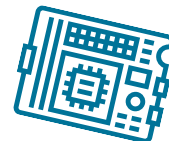


SPONSOR A CLASSROOM



\$1,500

=



20 KITS

Funding to pilot and grow Kits for the Classroom has been provided by our generous sponsors:

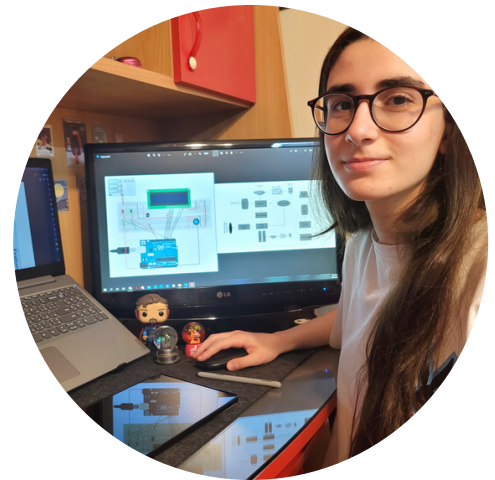
- Danaher Foundation
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- STEM RTP | Research Triangle Park
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VIRTUAL PROGRAMS

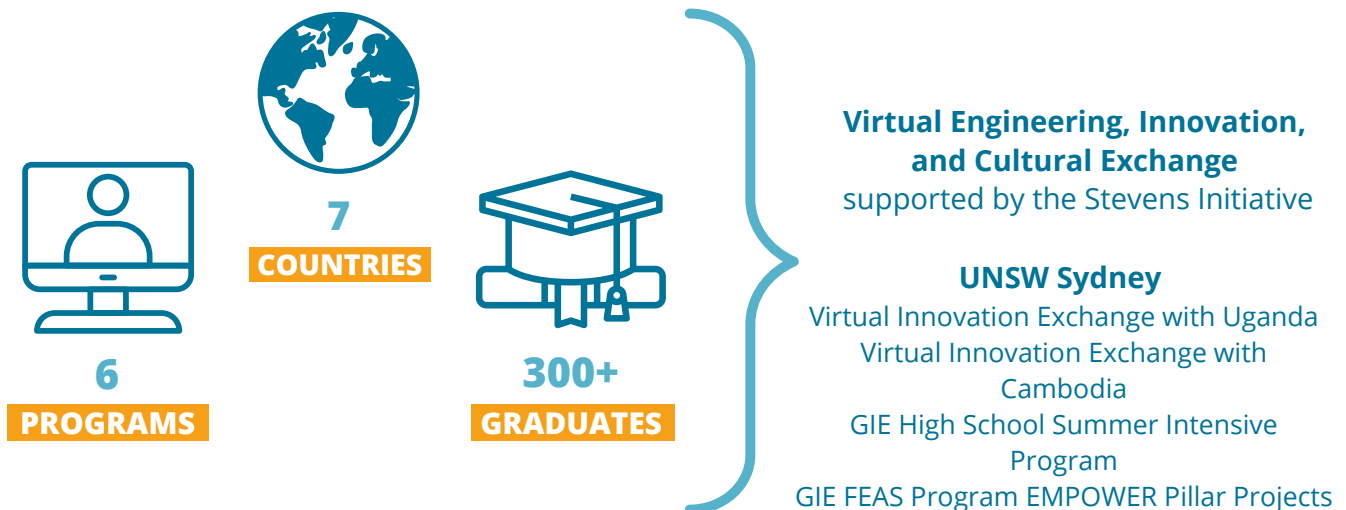
What started as a response to the COVID-19 pandemic has become a core part of our work; virtual programs enable EWH to reach more young people than ever before.

In June 2020, Engineering World Health was awarded a Stevens Initiative Coronavirus Response Fund grant to implement a virtual engineering exchange program between undergraduate STEM students in the U.S. and Lebanon. Over two years later, over 400 high school and university students from the U.S., Lebanon, and Jordan have participated in different iterations of the Virtual Engineering, Innovation, and Cultural Exchange program supported by the Stevens Initiative at the Aspen Institute.

"This was a phenomenal learning experience... I'm really thankful I got the opportunity to work with like-minded and motivated students!"



Building on the framework developed for these successful virtual exchange programs, EWH has continued to provide high quality engineering education and cultural exchange opportunities for high school and university students around the world. In 2022, we collaborated with UNSW Sydney to facilitate two virtual exchanges for Australian university students with their peers in Uganda and Cambodia, as well as two virtual engineering design programs for Australian high school girls through UNSW Sydney's Girls in Engineering program.



VIRTUAL PROGRAMS | HIGH SCHOOL DESIGN COMPETITION

In 2022, EWH hosted our first-ever design competition for high school students, modeled on our successful college design competition, open to high school students around the world. During the [Vontier Virtual High School Design Competition](#), students developed solutions to a low-resource healthcare challenge posed by EWH and submitted 3-5 minute videos outlining their ideas.

1ST PLACE HUSKY INNOVATE - FAIRMONT PREP

Dual-Cap Valve Protection for securing oxygen tanks

The Husky Innovate team focused on solving this issue in Uganda, where transportation and storage pose major risks to oxygen tank security and safety. Their design, which includes two cube-shaped caps at the end of each tank, also increases efficiency of transportation, increasing the number of tanks that a truck can safely transport. Each set of caps also features a ball and socket fastening mechanism to fix tanks together, minimizing movement during transport.



ANNA BECK + ELEANOR LEWIS

CoolRide, for cooling medicine with evaporative and chemical cooling



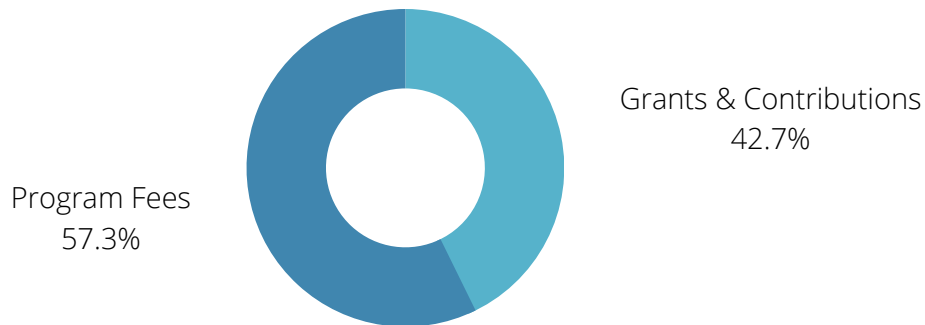
HUSKYVATION - FAIRMONT PREP

Low-cost multi-effect basin still for water distillation

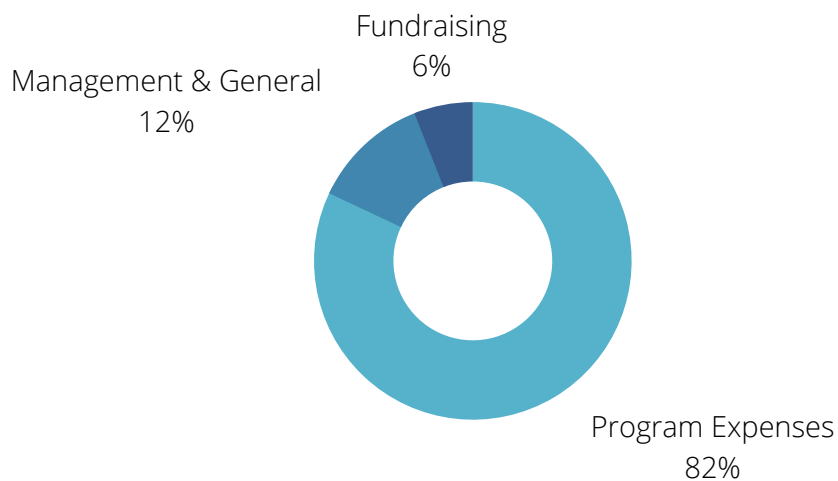
FINANCIAL STATEMENTS

Statement of Activities	FYE 9/30/21	FYE 9/30/22
Revenue, Support & Other Income		
Grants and Contributions	\$253,971	\$287,900
Program Fees	\$57,187	\$386,216
Investment and Other Income	\$208,006	(\$14,404)
<i>Total Revenue, Support & Other Income</i>	\$519,164	\$659,712
Expenses		
Program Expenses	\$341,259	\$664,452
Management and General	\$151,608	\$95,702
Fundraising	\$51,179	\$50,195
<i>Total Expenses</i>	\$544,046	\$810,349

FY22 INCOME



FY22 EXPENSES



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In Memoriam

Lynn Toby Fisher, JD

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Vontier

Special thanks to the Wallace H. Coulter Foundation for the early and generous support that enabled us to grow.

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