



COLLABORATIVE PARTNERSHIPS

OUR INTERNATIONAL WORK IN 2016



UK

ENGINEERS

WITHOUT BORDERS

THE GLOBAL CONTEXT

Over the last 50 years, huge advances have been made to reduce poverty and suffering around the world. However, millions of people still lack access to reliable energy, clean water, safe shelter, quality education, good health and decent employment. Our natural environment is being degraded and globally we are all experiencing the wide-reaching effects of climate change.

In 2016, the member states of the United Nations set out to tackle these global challenges through the creation and ratification of the Sustainable Development Goals (SDGs), a series of 17 interconnected targets that apply to all nations. Engineers Without Borders UK is working as part of a broad movement of organisations to achieve the SDGs and we advocate the critical role of engineering in their implementation and achievement.



OUR WORK

PROJECT LOCATIONS 2016

- International Volunteers 2016





INTRODUCTION

The following review showcases the impact of our work, our contribution to the SDGs and the difference we are making to lives around the world in collaboration with our local partners. Through our programmes, we are providing on-the-ground expertise and equipping future engineers with the skills and knowledge to practice engineering that benefits our global community. We call this Globally Responsible Engineering.

Our international programmes have enabled thousands of people to access engineering in 2016.

This means more communities in Africa, Asia and Latin America have access to clean water and sanitation, affordable, renewable energy and safe public buildings and spaces. We do this by adding vital engineering expertise to technical and innovative development projects, offering exceptional training courses to prepare engineers to undertake international development work and student engagement opportunities to expose the engineers of tomorrow to the social impact of engineering.

CHANGING LIVES AROUND THE WORLD



Volunteer Elliott Baxter tends the fire of the prototype 'Ray Stove'

"Before I used to cook with a normal mud stove. Cooking on the old stove emitted a lot of smoke which caused health problems and coughing but now with the Prakti stove it is much better. It also uses only two pieces of wood, much fewer than before and the stoves are much more efficient than traditional cookstoves. It also looks sturdy, safe, portable and can be used inside and outside the house. Mud stoves need to be replaced twice a year but the Prakti stove lasts much longer so I saw it as an investment."

Jyothi
Prakti Cookstove User





PARTNER: Prakti India.

Three billion people globally burn biomass and coal to cook their food and heat their homes. These solid fuels burn inefficiently and are immensely harmful to the users health; each year over 4 million premature deaths are attributed to household air pollution (WHO).

In India, Engineers Without Borders UK and our partner Prakti are working on the design, manufacture and distribution of clean and efficient cookstoves. These stoves

cook food much faster, use half the fuel and produce less smoke.

To increase their stove production Prakti need design and manufacturing expertise, something they struggle to find locally. Our volunteers are working with the organisation to develop and manufacture the 'Ray Stove' Prakti's cheapest stove yet, combining increased cost efficiency, durability and performance to enable even more people to live healthier lives.

ACHIEVING IN PARTNERSHIP



PARTNER: SIBAT The Philippines.

Engineers Without Borders UK has been collaborating with SIBAT in the Philippines for 10 years, working together to bring appropriate technology to rural, marginalised communities. SIBAT's CEO Shen Maglite reflects on what our partnership has achieved.

SIBAT Team, EWB-Imperial members and Anya Boyd, Head of International Partnerships, Engineers Without Borders UK in the SIBAT workshop.

Q. How has the partnership with Engineers Without Borders UK helped SIBAT deliver its work over the last decade?

"Engineers Without Borders UK volunteer engineers have significantly helped SIBAT's capacity to deliver appropriate technology services to rural poor communities. Volunteers have built capacity in the area of technology transfer, and improved the knowledge and competencies of our engineering team in the areas of design work, troubleshooting and innovation."

Q. How has the partnership evolved over this time?

"Engineers Without Borders UK engineers are now with us for longer periods which, given the wide area of SIBAT's work and need for technology transfer, provides greater assistance. Mid-term, junior volunteers have also been integrated into the programme and the partnership has improved coordination, recruitment and matching processes based on experience, lessons and insights learnt over the years."



Q. What impact have Engineers Without Borders UK engineers had on SIBAT's projects?

"With the help of Engineers Without Borders UK we have been able to significantly reduce the cost of our micro-hydro power systems, develop and grow our small wind programme, train and develop our in-house engineers and improve the operation and maintenance of our renewable energy and water systems."

Q. What skills do our volunteer engineers bring?

"Volunteers bring some really important skills that are not widely available in the Philippines. Particularly, they have experience and competencies in small wind systems and technology research and development that would not be accessible to us otherwise."

We are delighted to have made such a critical contribution to SIBAT's work over the last 10 years and look forward to continuing our collaboration with them.



BUILDING GLOBALLY RESPONSIBLE ENGINEERS

At Engineers Without Borders UK we give engineers the knowledge and experience to make a positive change in the world. Three former international volunteers tell us how their involvement with us has helped them inspire, enable and influence global responsibility through engineering and support the SDGs.

Our 2016 volunteers at the pre-departure training course

VISHAL SHAH

Project: Agro-machinery in India, 2014

Secondary school teacher in Science and Engineering

“My placement in India was in a technical role but while there I got involved with an education project called Invention Education and really enjoyed it and was inspired to go into teaching.

My placement taught me a lot about culture and the difference between the perception of ‘community needs’ and the reality of what people wanted. I also saw how insufficient resources were a barrier to the development of sustainable technologies and why working with local partners is so important to build capacity.

In my current role as a teacher I include the SDGs and international development topics in lessons when I can. I am also helping to start a Renewables Club at the school this September where students can learn how renewable technologies work, the contexts they can be used in, and how to design, make and test them using model and medium-sized versions. The eventual vision is to install permanent renewable technology in the school grounds.”



BRITTANY HARRIS

Project: Community Sanitation in Peru, 2015



Graduate water engineer at BuroHappold Engineering, ICE President's Apprentice and New Civil Engineer (NCE) Graduate of the Year

"My international project had a huge impact on me as an engineer. Working in the type of challenging environments you face with Engineers Without Borders UK is why I became an engineer in the first place, and having the opportunity to really experience those situations and develop my skills confirmed this is what I want to do. The responsive problem solving, lateral thinking and understanding of the need to consider the social context helps me every day in my work at BuroHappold.

I am currently campaigning through the *New Civil Engineer* magazine to engage civil engineers in the UN's Sustainable Development Goals (SDGs) and looking at how the sector can help achieve them. In addition, I am still supporting Engineers Without Borders UK's local partner EcoSwell to develop the sanitation system I designed on my placement and I am doing a similar water access assessment in a remote community in Kenya."

FRANCESCA O'HANLON

Project: Rainwater Harvesting in Mexico, 2013



PhD Candidate, 'Resilience to Natural Disasters in Urban Environments in Developing Countries', University of Cambridge

"My Engineers Without Borders UK experience was the first opportunity I got after finishing my undergraduate degree to learn what it felt like to use engineering to have a positive impact. It helped me understand that being a water engineer in international development was what I wanted to do as a career and that I only wanted to work for organisations that had visions I believed in.

After my experience in Mexico I worked for Médecins Sans Frontières (MSF) for two years as a water and sanitation engineer in the Central African Republic

and South Sudan, providing healthcare to populations in need. I was really focused on providing high quality water to populations that didn't have access to it with a lot of focus on educating people about waterborne diseases and the importance of good hygiene practices.

My current PhD research at Cambridge specifically links to the UN Sustainable Development Goals around urban resilience by looking at protecting populations from natural disasters and improving survival rates in extreme flooding events."

ENERGY



During 2016 we have worked with five incredible partner organisations to improve access to energy. Most significant is our research and development work on wind, solar, micro-hydro and cookstove technologies which have reduced product costs for end users and improved clean energy availability.

Volunteers Erica Bashin and Alex Stokic from EWB-Bath in Ghana

3 GOOD HEALTH AND WELL-BEING



7 AFFORDABLE AND CLEAN ENERGY



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



13 CLIMATE ACTION



AFFORDABLE OFF-GRID MICRO-HYDRO SYSTEMS

PARTNER: TONIBUNG, Malaysian Borneo and SIBAT, The Philippines

In the Philippines with SIBAT and in Malaysian Borneo with TONIBUNG our engineers have reduced the cost of micro-hydro systems by around \$2,000 each through the prototyping, design and development of an electronic load controller to regulate energy flow through the turbines. Ongoing for three years, the controller project

has involved both student and professional volunteer engineers from Engineers Without Borders UK.

The controller can now be fabricated by local technicians in-house at a lower cost and will be installed directly into micro-hydro systems.



CLEAN WATER AND SANITATION

Our engineers have been working hard to create solutions to problems such as unsafe drinking water, poor sanitation and urban flooding. The main impact of our work in Water, Sanitation and Hygiene (WASH) during 2016 has been through adding engineering expertise to infrastructure projects in Ghana and Kenya. In Mexico we are also pioneering a new low-cost chemical water filter to revolutionise how fluoride is removed from drinking water.

Volunteer Billy Thurston testing water samples in Mexico with Caminos de Agua



SUSTAINABLE URBAN WASTE MANAGEMENT

PARTNER: WSUP, Ghana

In Ghana we are providing engineering support and expertise to projects run by our partner Water and Sanitation for the Urban Poor (WSUP). They are working locally to develop sustainable sanitation solutions for Kumasi, the second largest city in Ghana, where 1.6 million people are without access to household toilets.

Our engineers are helping to address a lack of technical capacity in the local team by providing

engineering expertise on the rehabilitation of a large-scale liquid waste treatment plant and by offering business skills and training to the Clean Team, a social enterprise selling household cartridge toilets.

The rehabilitation of the plant is now progressing to the next stage and many more people now have household sanitation systems as a result.

BUILT ENVIRONMENT

Our work in the built environment during 2016 has focused on providing engineering support to architects redeveloping public spaces in Kenya and building hospitals and schools in Rwanda. The role of engineers in the construction process is fundamental to building safe, stable structures and through our volunteers' engineering support thousands of people are benefitting.



Rosie Goldrick working on site with Mass Design Group, Rwanda

EDUCATING ENGINEERS ABOUT SUSTAINABLE DEVELOPMENT



Engineers Without Borders UK has a strong history of supporting engineering students to engage with and learn about international development work. Whether it is through our international training courses, our student opportunities or our longer international secondments we are enabling engineers to gain the experience and skills they need to become more globally responsible in their engineering practice.





LOW-FAB SEISMIC DESIGN

PARTNER: MASS DESIGN GROUP, RWANDA

Rwanda is in East Africa's seismic zone but the country lacks engineers with earthquake design skills. This has resulted in a severe lack of seismic knowledge in the structural engineering sector and buildings have poor earthquake resilience.

Our engineers have been working with our partner MASS Design Group for the last two years, bringing seismic and geotechnical expertise to projects such as schools, hospitals and public buildings. Volunteers are also adding to the seismic capacity within the MASS team by mentoring Rwandan engineers and teaching in the organisation's African Design Centre.

The result of this work means that MASS's life-changing buildings are safer and more secure in the event of an earthquake and local engineers have the seismic knowledge to continue the work after our volunteers leave.



GLOBAL ENGINEER FELLOWSHIPS

In 2016, we introduced our Global Engineer Fellowships, a new initiative that places a small team of senior and junior engineers together to work on a project.

Our Senior Fellows are individuals with at least two years' professional experience who want to strengthen their managerial and mentoring skills. Our Junior Fellows are undergraduate engineers who want to experience development work first-hand and provide technical research assistance in a supportive environment.



This year our fellowship teams worked together to bring clean water to remote communities in Mexico, mapped flood defenses in Kenya and improved the design of micro-hydro systems in Borneo.

In 2017, we are continuing to develop the fellowship programme and are looking to find the most passionate and driven students and practicing engineers to help us.

Initiative supported in part by The Happold Foundation.

ALUMNI AND PARTNERS

INTERNATIONAL VOLUNTEERS 2016

Calum Robb
Dan Frydman
Elliott Baxter
Isobelle Logan
James Foreman
Jennifer Hawkin
Jonathan Clowes
Navjot Sawhney
Patrick Sharkey
Rebecca Rabjohns
Rodoula Gregoriot
Rosie Goldrick
Sarah Mitchell
Stuart Llewellyn
Tash Perros
Thomas Britnell

INTERNATIONAL PARTNERS 2016

Caminos de Agua
Energy 4 Imparct (formerly GVEP)
Great Lakes Energy (GLE)
Kounkuey Design Initiative (KDI)
MASS Design Group
Light Up the World
OK Clean Water
Prakti
Sibol ng Agham at Teknolohiya (SIBAT)
TONIBUNG
Wind Aid
WSUP

2016 MEMBER-LED PARTNERSHIP TEAMS FROM:

EWB Bath University
EWB Bristol University
EWB Imperial University
EWB University College London

2016 JUNIOR FELLOWSHIP TEAMS FROM:

EWB University College London
EWB Strathclyde University

2016 MEMBER-LED PARTNERSHIP PARTNERS

Estamos Mozambique
Gawad Kalinga
OAN International
Volunteer West Africa

2016 FELLOWSHIP PARTNERS:

Caminos de Agua
Kounkuey Design Initiative (KDI)
TONIBUNG

Volunteer Stuart Llewellyn measuring the base for a home sanitation system at WindAid in Peru.

2016 IN NUMBERS

6,300 Beneficiaries

10 Countries

20,700

volunteer hours contributed to
Engineers Without Borders UK
international programmes in
2016

16 Partner Organisations

46 Engineers

LOOKING AHEAD

In 2016, our work has benefited 6,300 of the world's most vulnerable people, bringing clean water and sanitation, reliable, renewable energy and safe and dignified shelter to communities. This year our engineers have contributed a staggering 20,700 hours to development initiatives, building capacity within our partner organisations.

We can only continue to do this incredible work with the support of our community. To donate to Engineers Without Borders UK simply send a text message to **70070** including our unique code - **EWBX16** - and the amount you want to donate. For example: **'EWBX16£10'**.



Special thanks to our Primary Programme Sponsor the Bechtel Foundation.

Our Vision is a world where people everywhere have equal access to the benefits of engineering.

Our Mission is to lead a movement that inspires, enables and influences global responsibility through engineering.

Join us today by visiting our website at www.ewb-uk.org and signing up to become a member!

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