



SHARING SKILLS
CHANGING LIVES

CHRISTIAN ENGINEERS IN DEVELOPMENT
Annual Review 2023/2024

Christian Engineers in Development

CED is a Christian professional consultancy service dedicated to development work in partnership with overseas communities.

Executive Committee:

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David Beak FCA BA(Econ)
Ian Bell MSc DipArb CEng MICE
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*Above: donkeys delivering materials for water tank, Geita, Tanzania
Front cover: flushing the well at Sathya Vada Bible College, India*

From the Chair of the Executive Committee

Welcome to the Annual Review! It has been an interesting year with some challenges and some encouragements.

One encouragement has been that we have been able to involve more of the membership in project work, which is great. But that encouragement is tempered a little by the knowledge that there are at least some members who would like to be involved in projects, but as yet we have not managed to find a role for everyone. If that is you, please accept our heartfelt apologies, and please do get in touch with any of the Exec Committee members to make sure that we know about your desire to serve. Whilst some of the work of project development is technical in nature, there are non-technical tasks which also require your input – such as project publicity, document control, report-writing and funding proposal writing – all of which are necessary to the success of a project.

On the subject of publicity, we recognise the need to improve the visibility of projects, and we want to produce short project videos which tell of the successes and the challenges – and really give a flavour of what change looks like “on the ground”. Could you help us with that?

After many years of faithful service, Alan



Michell has made the difficult decision to retire from the Exec Committee. Alan has done a power of work over the past 10 years as a member of the Board and then of the Exec Committee, and has been the driving force behind several projects in Rwanda and in Sierra Leone. We are very grateful for his friendship and his service – and we’re not the only ones – there are literally thousands of people in Rwanda and Sierra Leone whose lives have been positively impacted by Alan – his drive and his enthusiasm, and his faith in his Lord. So a big “thankyou” to Alan, from all of us! And we hope to see you at CED events for many years to come.

My thanks also to the other members of the Exec Committee for their work during this past year. Thanks also to the Board for their unwavering support and wise governance.

Jonathan Appleby



People queuing for water from an unprotected spring in rural Tanzania. They have a right to something better!

For We are God's Fellow Workers

(1 Corinthians 3 v 9)

What a privilege it is to be chosen to be a "fellow worker" of our Almighty God!

We are invited to use our varied engineering, professional and practical skills to do God's work and to bring both his love and improved lives to those with whom CED works throughout His world.

Once again, may I thank all those within CED, and those who work alongside us, for doing just that, including particularly, of course, those on the board and the Exec Committee who work tirelessly to ensure that the charity is run in such a highly professional manner.

Membership

CED continues to grow its membership and has reached 86 members this year across a range of engineering disciplines. With a growing membership group the challenge is always to try to keep members engaged with the work of CED and getting involved with projects.

See below for a brief introduction to members who have joined since the publication of last year's review:

Daniel Peters (Aug 23) – works as a Design Engineer with an electrical engineering background.

Colin Mapperley (Aug 23) – retired Director of Estates & Facilities for Frimley Health NHS Foundation Trust, with an electrical engineering maintenance background.

Andy Wood (Nov 23) – Currently works for the University of Strathclyde and has extensive experience working with water systems and hydropower.

Trevor Burns (Dec 23) – retired building / fire



I look forward to meeting CED members and supporters in Stamford at our AGM 5th October 2024 and may I express my thanks, on behalf of CED, to Ian Bell and members of his church for kindly hosting us this year.

Rob Brighouse, Chair of the Trustees

engineer. Head of estate services for the Southern Health and Social Services Trust in Northern Ireland.

Joshua Yuen (March 24) – worked as a project and maintenance engineer overseeing capital works projects and maintaining public assets for the Hong Kong government, with a civil engineering background.

Darran Waters (April 24) – works as a civil engineer for Arup, managing a variety of mostly wastewater projects for Welsh Water and lives in Cardiff.

Matthew Colquhoun (Aug 24) – has a background in mechanical engineering and currently mentors international MSc engineering management students at the University of Birmingham.

If any member would like to discuss how they might become more involved with the work of CED, whether through projects or in other important ways, please do get in touch.

Jonny Burns, Membership Secretary

Project Roundup

Review of CED Projects, April 2023 – August 2024:

DR Congo:



Turbines, Lwamba Hospital

The pico-hydro equipment for Lwamba Hospital was successfully installed and commissioned in late 2023, and is now running well, providing much-needed power for the operation of the hospital facilities. Training has been carried out, and an Operation and Maintenance Manual produced. Thanks to Jono Cox, Graham Miller and Rob Wakeling for their input to this challenging project.

Uganda



Welding a flange, Kuluva Hydro

Trevor Burns and Jonathan Appleby visited Uganda in March 2024. They spent a week at Kuluva Hospital near Arua, carrying out some work on the hydropower installation there. Kuluva's hydropower scheme is in need of refurbishment; a new Ossberger turbine was ordered from Germany in 2023, and was finally delivered to Kuluva in August 2024. In the meantime, we've been helping the team at Kuluva to carry out some refurbishment work on the existing pipeline, intake and power house, so that all is ready for the new turbine to be installed. Jonathan Appleby and Darran Waters are planning to return to Kuluva in early October 2024, to oversee the installation of the new equipment.



Kagando Hospital

Trevor and Jonathan also spent a week at Kagando Hospital, carrying out some survey work for the proposed Solar PV installation, and also visiting some prospective suppliers of equipment. Back in the UK, Graham Miller and David Bookham have put in a huge amount of work assisting with the design specification for the Solar PV installation, and assessing the bids from prospective suppliers. We are very grateful to them for their input into this project, which is technically challenging. David has written a short article for this Review about their work on this technically challenging project.



Clariwash filter, Kagando Hospital

Whilst at Kagando, Trevor and Jonathan were supposed to finish commissioning the Clariwash filters for the hospital water supply. Unfortunately we were unable to do so because of problems with the delivery of raw water, which meant that there was insufficient water for the treatment plant to operate. Another problem to overcome; not one created by CED, as we didn't have much influence on the raw water supply – but one which we now have to try to solve with the hospital.



The well at God's Love School

Trevor and Jonathan also visited God's Love School and Orphanage in Kampala, which was experiencing a shortage of potable water. At the time of writing work is under way to rehabilitate one well at the School and drill a shallow borewell for the Orphanage. Our thanks to Trevor and of course to Philip Tibenderana for driving this small project forward.

Tanzania



Removing the steelwork skeleton

The rainwater harvesting programme near Lake Victoria continues to develop and grow. Ian Rankin has delivered three training courses since April 2023 and 53 builders have been added to our pool of constructors. We now have partners in five centres and are developing a "franchise" system, with our "franchisee" partners responsible for delivering the tanks, supported by technical advice and grants offered by CED as "franchisor", including the tap-twinning initiative promoted through the CED website. The programme has its own webpage on www.ced.org.uk with FAQs, photos and a map as well as information about tap-twinning.



Spillway, Buhuri Dam

Rob Wakeling has been leading a team looking at the possibility of rehabilitating Buhuri Dam in Tanzania. Thanks to input from Victor Lira and Jonathan Hinks we now have a plan of action, and we know that the rehabilitation work will likely cost in the region of £60k to complete.

India



Lining the borewell at Sathya Veda Bible College, Kerala

We're pleased to report that the borehole at Sathya Veda Bible College was successfully rehabilitated, and is now functioning well. Perseverance paid off! Graham Miller has written a short article about the project for this Review, and our thanks go to him and to Mike Yallop and Steven Harris for their assistance in the successful conclusion of the project.

Sierra Leone:



Water tower, Manowa, Sierra Leone

The project to provide a sustainable water supply to the community of Manowa, Sierra Leone, has been beset by delays and minor setbacks during 2024, and we are hoping that we can conclude the construction phase by the end of 2024. It is probably fair to say that we overestimated the capabilities of our partner organisation in Sierra Leone, and as a result there has been a fair amount of abortive or poor-quality work carried out on site. Alan Michell and Barbara Brighthouse have had to put in a lot more work here in the UK to support the project than we anticipated. A learning experience for CED!

We look forward to the coming year, in anticipation of God's provision and leading, as we seek to serve the poor in His name.

Jonathan Appleby

New Borewell, Sathya Veda Bible College, India

We have just completed a project working with a Bible college in South Kerala to improve the water supply for the college campus.

By studying groundwater reports, we were able to ascertain that there was an aquifer located 270m below the college that had the potential capacity to provide up to 6,000 litres/day of water for the college.

CED worked alongside the Bible college and local drilling contractors in order to construct a suitable borehole. On the first attempt the yield was poor. The borehole was then lined to help improve the yield and the quality of the water, and now has a 5hp electric submersible motor which pumps water into a header tank located on the roof of the college. The new borehole is now providing in excess



Borewell under construction

of 30,000 litres/day, 5 times the expected yield!

The college currently has 200 students living on campus with an intended future capacity to accommodate a further 100 students. There are also a further 35 staff currently living on campus. As a result of the work carried out by the college, 157 churches have been planted across India with several hundred people in each congregation. This project will help the college fulfil its mission to train and equip men and women as pastors and church leaders.

Graham Miller

Tanzania Rainwater Harvesting (RWH) Programme

The year saw the RWH programme grow from two centres – Kagera and Biharamulo – to five, including Lweru then Geita, and the incorporation of the previously trained group in Musoma. The course content is by now well established. It is a mix of classroom and practical work and we manage to leave 3 completed (or almost complete) tanks when the students go home after ten days' intense work with long days.

The courses are led by myself with support from Leonard Safari, a graduate in community development with great teaching skills.

Between us we manage to get the ideas across. The students, often with little formal education, are always full of questions and sessions can easily over-run their allotted time. Many find it difficult to lift information from the drawings and Leonard teaches the basic sizes by rote so they don't need to rely on drawings. One day we'll have video instructions! I hammer away about the importance of good sand and not adding too much water to the mix and so on. At the end of the course we award certificates which are much appreciated.

Ian Rankin



Lweru training workshop, seminar

Solar PV Project, Kagando Hospital, Uganda



We have been helping the Friends of Kagando with the tender process for a solar PV system. The requirement is to reduce the operating costs of the existing 3 phase 65kW supply.

The site currently uses the grid, but this is unreliable, and outages are common, resulting in regular use of a diesel genset.

The proposed PV system comprises multiple series-connected photovoltaic panels, each string totalling ~600Vdc and each feeding into its own dc-ac inverter connected in parallel across an ac busbar.

The inverters are “Grid tied” but since export back to the Grid is not allowed, the inverters need to be controlled to provide load balancing. This has to be dynamic as the power generated by the PV system will vary during cloud cover and at dusk and dawn and will fall to zero at night.

The high capital cost of batteries means a traditional hybrid solution is not affordable. Full-life costing has been considered, and whilst PV panels are guaranteed for 25+ years, the lifetime of inverters and (potentially) batteries is significantly shorter, and so planned replacements have been costed into each potential configuration.

We have been working with Kagando to finalise cable sizes and working Voltage ranges and provide expertise that was not fully addressed in the original proposals.

During loss of the grid, the genset needs to work at >30% of its rated load, to:

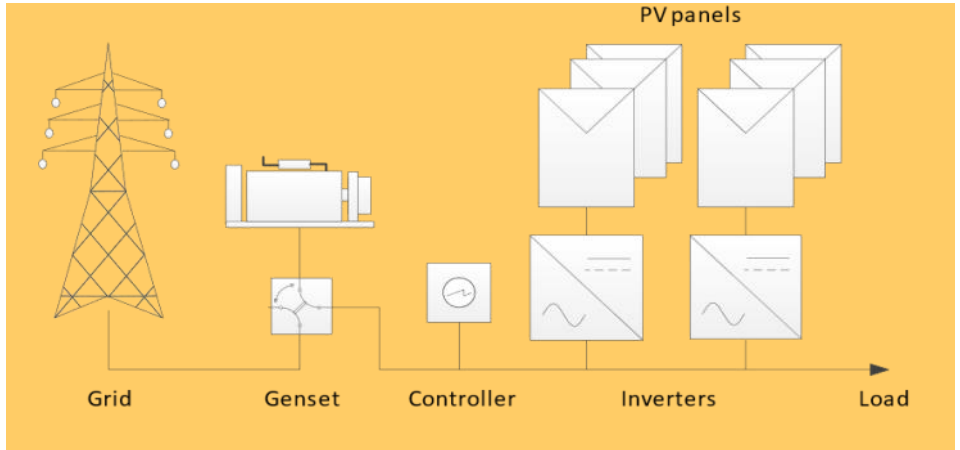
- ◆ Ensure a rapid response to step changes in the loading.
- ◆ Minimise diesel consumption.
- ◆ Reduce wear and maintenance.

The genset must also have sufficient spinning reserve to respond to rapid increase in the load since the Voltage and frequency fluctuation might exceed the reference limits required by the inverters. This is particularly arduous as the power usage increases by >300% at peak times due to staff cooking their meals.

As of August 2024, the project is still ongoing, and we would value your prayers in finding a technically compliant solution that is still within budget.

If you would like to provide financial support to this project, we are happy to put you in direct contact with Friends of Kagando

David Bookham and Graham Miller
PV panels



Project Highlights April 23 - March 24

Democratic Republic of Congo:

- ▶ Advice and assistance with the refurbishment of a pico-hydro scheme at Lwamba Hospital.

Sierra Leone:

- ▶ Drilling of borehole, building of water tank storage tower, installation of pipe work/taps as part of water supply scheme for the Manowa community.

Tanzania:

- ▶ Continued training and development of rainwater harvesting tank programme with Kagera, Biharamulo, Lweru and Geita dioceses. Funding support provided for tank construction material costs. Launch of Tap Twinning concept to support programme sustainability.
- ▶ Provision of design/engineering support for required repair of dam at Buhuri.

Uganda:

- ▶ Continued engineering advice given for hydro schemes at Rwembya and Kuluva.
- ▶ Installation of second phase of Kagando Hospital Clariwash water filtration scheme.
- ▶ Commencement of provision of engineering advice for solar scheme at Kagando Hospital.

No.	Project	B/F	Income	Expend	Transfer	C/F
		£	£	£	£	£
CN02	DRC: Lwamba Hospital electrical systems support			-912	912	
RW00	Rwanda: Project evaluation			-2,248	2,248	
SL01	Sierra Leone: Manowa water supply	51,318	17,240	-73,382	4,824	
	SECMA grant Manowa/Tanzania Rainwater harvesting		47,000		-4,824	42,176
TZ00	Tanzania: Project evaluation			-230	230	
TZ20	Tanzania rainwater harvesting programme	4,286	5,404	-18,475	8,785	
TZ 22	Tanzania: Buhuri dam repair			-714	714	
UG00	Uganda general costs	32		-2,603	2,571	
UG40	Uganda: Rwembya hydro scheme	2,442		-546	-1,896	
UG42	Uganda: Kagando Hospital water treatment scheme	12,163	250	-12,212	-201	
UG43	Uganda: Kuluva hydro scheme		1,250	-6,687	5,437	
UG46	Uganda:Kagando Hospital Solar scheme			-605	2,502	1,897
		70,241	71,144	-118,614	21,302	44,073



Newly completed rainwater tank, Geita

Financial Summary

The CED financial position continues to be healthy largely as a result of a legacy received in 2017 and grants received in 2023/24 to be used to meet specific future project costs.

The level of donation from supporters and other individual donors remained at an encouragingly high level. The generosity of many individuals, churches and charities who regularly support us is greatly valued.

Significant donations were received from members and supporters towards the Manowa water supply project, Rainwater Harvesting tanks programme in Tanzania and Kuluva Hydro scheme in Uganda.

In addition the Board were grateful to receive a grant from Scottish Episcopal Church Mission Association for the Manowa water supply scheme in Sierra Leone and Rainwater Harvesting programme in Tanzania.

Other income benefitted from rising interest rates.

Generally the costs of managing the charity are kept low as most activity is undertaken on a voluntary basis.

David Beak, Treasurer

	Unrestr'd Funds £	Design'd Funds £	Restric'd Funds £	Total 2024 £	Total 2023 £
Income and endowments from:					
Donations and legacies	26,702	-	24,144	50,846	56,374
Charitable activities	-	-	47,000	47,000	63,000
Other	310	7,277	-	7,587	2,867
Total	27,012	7,277	71,144	105,433	122,241
Expenditure on:					
Raising funds	1,254	-	-	1,254	956
Charitable activities	4,931	-	118,614	123,545	74,392
Total	6,185	-	118,614	124,799	75,349
Net Income / (expenditure)	20,827	7,277	(47,470)	(19,366)	46,892
Transfers between funds	(20,800)	(502)	21,302	-	-
Net movement in funds	27	6,775	(26,168)	(19,366)	46,892
Total funds brought forward at 1 April 2023	9,990	95,401	70,241	175,632	128,740
Total funds carried fwd 31 March 2024	10,017	102,176	44,073	156,266	175,632

CED exists to demonstrate the love of Christ by enabling Christians with engineering and allied skills to help the poorest communities overseas.

We invite supporters to become involved through:

- *Praying regularly for CED*
- *Raising the profile of CED*
- *Making donations*
- *Fundraising for specific projects*

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Above: completion of cement tank training course, Geita, Tanzania.

