



POWERING POTENTIAL IN CLEAN ENERGY

An Independent Programme Evaluation of The Efficiency for Access Design Challenge (2019-2025)

for Energy Saving Trust, co-secretariat of Efficiency for Access,
and Engineers Without Borders UK

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April 2026





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A full glossary of terms is provided in Appendix 1.

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1. EXECUTIVE SUMMARY

The Efficiency for Access Design Challenge (the Challenge) is a global, multidisciplinary competition that empowers teams of university students to help accelerate clean energy access. The Challenge is delivered by Energy Saving Trust, co-secretariat of Efficiency for Access, in collaboration with Engineers Without Borders UK. There have been six rounds of the Challenge since its launch in 2019.

This independent evaluation assesses the effectiveness, outcomes and wider contributions of the Challenge, and identifies opportunities for future workforce and skills development initiatives within the clean energy sector.

Delivery and reach

The Challenge successfully reached a diverse cohort of students and expanded significantly over its lifetime. Over six years, it engaged **691 students from 42 universities across 18 countries**. It attracted students who were interested in developing a career in clean energy, often stemming from their own lived experience of energy access challenges.

Students valued the blend of project-based and applied learning, structured mentoring, prototyping opportunities and exposure to real-world energy access challenges. Educators consistently described the Challenge as a high-quality, well-run programme that complemented existing curricula and introduced pedagogical practices not typically embedded in higher education.

The difference the Challenge made

The strongest evidence of impact relates to students' skill development and subsequent career trajectories. A survey of alumni participants shows that:

More than two-thirds (68%) entered the clean energy sector, either through employment, entrepreneurship or further study.

100% applied at least one skill gained through the Challenge within their studies, start-ups or employment.

The skills participants most frequently applied were **essential workplace skills** (such as teamwork and collaboration, communication and delivering presentations), **technical skills**, and **inclusive design**.



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Wider impact

The Challenge generated ripple effects that extended beyond students. Educators described significant improvements in their ability to design and deliver project-based or applied learning, facilitate interdisciplinary teamwork and support inclusive design. In some cases, the Challenge influenced curriculum reform, teaching culture and cross-departmental collaboration.

Barriers to entering and progressing in the clean energy sector

Across alumni, educators, mentors and partners, the evaluation identified a complex set of barriers that hinder graduates' entry and progression within clean energy roles. These include:

- **Insufficient entry-level jobs** and limited visibility of opportunities in many countries.
- **Structural and political barriers**, including weak policy environments and inconsistent government support.
- **Skills and experience gaps**, particularly limited practical exposure and software skills.
- **Financial constraints**, including the high cost of equipment, limited capital for start-ups and the affordability of specialist training.
- **Geographical disparities**, with most clean energy jobs located in cities rather than rural or off-grid communities.
- **Persistent gender barriers**, including discriminatory assumptions and lack of confidence among some women entering technical fields.
- **Weak professional networks**, with many graduates lacking mentors or peer networks.

These barriers highlight that, while the Challenge is effective in developing capable graduates, broader systemic constraints continue to limit sectoral growth.

The contribution and opportunity

Evaluation evidence shows that the Challenge occupies a **distinct and valued niche** within the clean energy skills ecosystem. Its contribution lies in **developing the people** who will shape the sector's future - innovators, engineers, digital specialists, entrepreneurs and other specialists.

Looking ahead, there is considerable opportunity to build on this potential, including:

- **More intentional industry collaboration**, including co-designed themes, internships, and clearer pathways into employment.
- **Stronger peer and alumni networks**, particularly for early-stage innovators.
- **Greater interdisciplinary working**, reflecting the sector's need for digital, commercial, and user-centred skills.
- **Broader support to universities**, including curriculum development, access to facilities and industry brokerage.

With these refinements, the Challenge - or a successor programme - could play an even more strategic role in strengthening the clean energy workforce in sub-Saharan Africa, South Asia and beyond.

2. THE EFFICIENCY FOR ACCESS DESIGN CHALLENGE IN NUMBERS

The Efficiency for Access Design Challenge is a global, multidisciplinary competition that empowers university student teams to help accelerate access to clean energy worldwide.



691

students



74%

of students from low- to middle-income countries



42

universities



18

countries

A pathway to the clean energy sector

Figures based on alumni survey respondents



88%

are in employment, self-employment or further study



68%

are working or studying in the clean energy sector



100%

have applied their learning and skills in their careers or studies since

Top skills gained and applied after the Challenge

- Essential workplace skills
- Technical design and prototyping
- Inclusive design



Systemic influence on universities

- Increased adoption among some educators of **project-based learning**
- Some universities changed curriculum towards **project-based learning and community engagement**
- **Stronger links** between universities, industry mentors and international networks

3. INTRODUCTION

About the Efficiency for Access Design Challenge

The Efficiency for Access Design Challenge (the Challenge) is a global competition that equips and inspires engineering and other university students to access and advance careers within the clean energy sector. Delivered from 2019 to 2025 by Energy Saving Trust, co-secretariat of Efficiency for Access, in partnership with Engineers Without Borders UK, the Challenge formed part of the Low Energy Inclusive Appliances (LEIA) programme, funded by the IKEA Foundation and the UK government through the Transforming Energy Access (TEA) platform.

Purpose and vision

The Challenge seeks to inspire and upskill the next generation of clean energy professionals to tackle global energy challenges by applying their skills and knowledge to real-world problems. It aims to:

- Build students' **understanding of energy access and the role of efficient appliances** in achieving affordable and clean energy for all.
- Upskill students in **technical, professional, and inclusive design skills**, preparing them for careers in the clean energy sector.
- Strengthen collaboration between **universities, industry, and development partners**, fostering innovation and knowledge exchange.
- Contribute to a more **diverse and inclusive clean energy workforce**, particularly in sub-Saharan Africa and South Asia.

Programme design and delivery

Working in teams of two to five, students research, design, and present an affordable, energy-efficient appliance or enabling technology for off- and weak-grid contexts. Support includes mentoring from industry professionals, themed webinars, and, where funding is awarded, the opportunity to develop a prototype. Teams produce written and video submissions, which are assessed against criteria covering innovation, sustainability, social impact, and business model. Finalists are recognised at a virtual Grand Final.



Photo credit: Unsplash

How the Challenge has evolved

Since its launch, the Challenge has **grown into a globally recognised platform that blends technical education with global responsibility**. Reaching **691 students across six years**, participation grew rapidly - increasing participant numbers from 70 across nine

universities in Year 1 to 143 students across 18 universities by Year 6. Participation from sub-Saharan Africa increased fivefold over this period, and students from low- to middle-income countries rose from 39% to 90%.

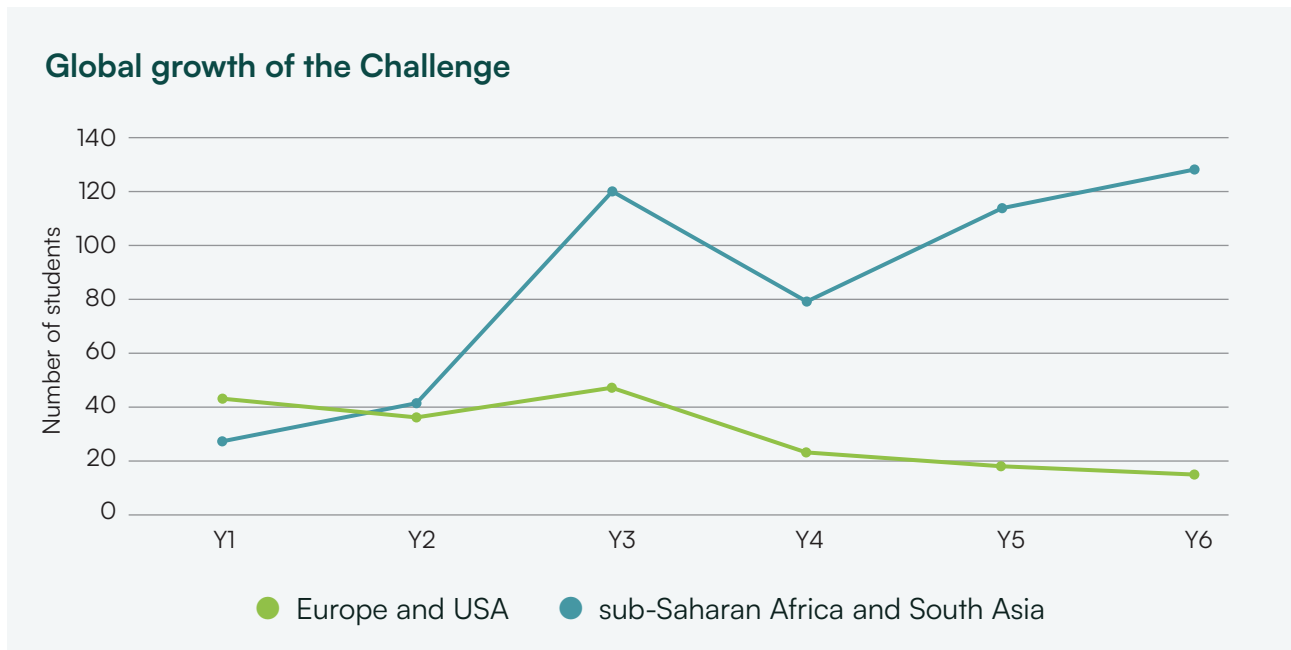


Figure 1: Growth in student participation in the Challenge

To manage growth sustainably, partners adapted the delivery model, allowing more teams per university, who were supported by a wider range of mentors (from different disciplines, backgrounds and countries). **Continuous learning has shaped programme design:** process reviews led to strengthened digital infrastructure, earlier mentor matching, clearer expectations, and improvements in tracking prototype funding and progress.



Photo credit: Unsplash

The context: Why the Challenge is needed

Global access to energy remains deeply unequal. Sustainable Energy for All (2025)¹ reports that **666 million people still lack electricity**; many more experience unreliable or weak-grid supply that constrains livelihoods and economic growth. In these settings, **efficient appliances and enabling technologies** are vital for improving living standards, supporting productive use of energy and reducing emissions.

Sitting at the intersection of critical global needs and supporting three Sustainable Development Goals, the Challenge mobilised student talent and encouraged innovation in appliance and system design. It supported clean energy access (SDG 7), green skills and employment pathways (SDG 8) and climate-resilient innovation (SDG 13).



About this evaluation

This independent evaluation, designed and delivered by **Insley Consulting**, takes place after the Challenge's six-year run, when Energy Saving Trust is reviewing its workforce and skills development portfolio **in response to identified skills shortages in the clean energy workforce in sub-Saharan Africa and South Asia**. The pause provides an opportunity to reflect on the Challenge's achievements, challenges, and legacy, and to consider future pathways to develop a skilled and inclusive clean energy workforce.

The evaluation is a **mixed-methods summative study**, designed to explore the Challenge's **reach, outcomes, workforce barriers to entry in the clean energy sector, and wider impacts**. The findings are organised around a set of overarching evaluation questions. See Appendix 2 for a more detailed overview of questions and evaluation methods.

Evaluation methods



6 years of records reviewed



152 survey responses from alumni participants²



19 people interviewed



9 alumni participants in two focus groups

¹ Sustainable Energy for All (2025). *Tracking SDG7: The Energy Progress Report 2025*

² Not every respondent answered every question

4. WHO THE CHALLENGE REACHED

Universities and disciplines

The Challenge was delivered within both **undergraduate and postgraduate degrees across the globe**, with a planned expansion into sub-Saharan Africa and South Asia.

The Challenge Brief encouraged multidisciplinary teams. In practice, however, logistical challenges, including the allocation of course credits, hindered the formation of cross-faculty teams. Mechanical and electrical engineering were the dominant disciplines, although some universities attracted students from diverse departments, including product design, computing, business, and environmental science.

Educators and delivery partners observed that multidisciplinary teams brought different strengths, perspectives and prior experiences to their projects, and that this diversity often broadened discussions and deepened students' appreciation of real-world constraints. Emilee Carmichael (Head of International, Energy Saving Trust) noted that teams without business or marketing expertise tended to be weaker in terms of their business model designs, and that those with interdisciplinary collaborations - including inter-university teams - had produced some of the strongest entries.

To bring a wider skill set and encourage students to consider market and user needs alongside engineering design, **mentors were proactively recruited from diverse professional backgrounds and specialisms.** Educators and students valued this approach, noting that mentors helped students think holistically in ways not typically covered in the core curriculum.



691 students



74% from low- to middle-income countries



29% female



42 universities



18 countries



IMPACT STORY

Interdisciplinary collaboration for flood-affected communities

When master's students **Shaveen de Almeida** and **Afsana Sharmin** joined the Efficiency for Access Design Challenge through Aston University (in the UK), they represented both **different disciplines** and **different parts of the world** - Shaveen is from a **chemical engineering** background in Sri Lanka, while Afsana is from Bangladesh and did an undergraduate degree in **Textile Engineering**. Their wider team included peers from Pakistan, Jordan and Yemen, all studying for the **MSc in Sustainable Engineering**, with some bringing lived-experience of climate vulnerability and energy access challenges.

This interdisciplinary, international mix shaped the problem they chose to tackle - ensuring access to education for children in Pakistan's flood-affected regions, where schools are routinely disrupted and electricity supply is unreliable. Drawing on shared personal motivations and contrasting technical strengths, the team designed a **solar-powered information and communication technology (ICT) education system** capable of operating independently from the grid during prolonged flooding.



Shaveen de Almeida (left) and Afsana Sharmin (right)

Shaveen and Afsana described developing strong **project management, problem-solving and teamwork skills**, particularly through coordinating tasks, managing limited time and navigating cultural and communication differences.

They also highlighted gaining **user-centred design skills**, a deeper understanding of **inclusive engineering**, and increased confidence in applying engineering concepts to real-world problems.

“The Challenge opened my eyes to real-world impact - designing for people, not just performance.”

Shaveen de Almeida, former Challenge participant, Aston University (UK)

Collaboration across disciplines taught the team members how to balance different technical assumptions and communicate effectively within international teams - skills they now apply in their respective careers. Shaveen works as an **Energy Analyst at Welsh Water**, while Afsana is pursuing a **PhD at Loughborough University** on microplastics transformation and detection in environmental systems and life-cycle analysis. Both students reported that the Challenge increased their confidence, work readiness and motivation to pursue work with a social impact.



Female participants

Across the six-year period, **29% of Challenge participants identified as women**. This is reasonably comparable to the International Renewable Energy Agency's (IRENA) global analysis which shows that women hold 32% of full-time jobs in the renewable energy sector - higher than in oil and gas (23%) but below women's global workforce average of 43%³.

Despite delivery partners' efforts to improve gender diversity (for example, introducing targeted **gender-focused webinars**, more **female mentors**, and embedding gender metrics into monitoring systems), this did not result in a proportional increase in the number of female participants.

Several educators and partners noted that gender diversity enriched the design processes and strengthened teams' ability to incorporate inclusive design. Nyamolo Abagi (CLASP) suggested that **gender-balanced teams create more inclusive learning environments** and emphasised the importance of representation.

“As a woman, and as a woman of colour, you have to see a representation of yourself. Those signals are super important.”

Nyamolo Abagi, Director, Clean Energy Access, CLASP

Students who are motivated to pursue careers in the clean energy sector

Across interviews with educators, mentors and students, a consistent theme emerged: **the Challenge reached students who are keen to pursue careers in the clean energy sector, and it significantly strengthened their motivation.**

Educators described the Challenge as a powerful catalyst for broadening students' understanding of what clean energy careers can look like, helping them see the sector as a field that spans engineering, community engagement, entrepreneurship, and digital innovation. Mentors also observed that the Challenge helped students think critically about their career paths, giving them a clearer sense of purpose and a determination to work in clean energy.

Alumni frequently described the Challenge as pivotal in shaping or sharpening their career aspirations. One survey respondent explained: **“The experience deepened my interest in the renewable energy sector ... and shaped my career aspirations.”** This led them to pursue a career in clean energy after graduation.

³ IRENA (2025), Renewable energy: A Gender perspective; Second edition, International Renewable Energy Agency, Abu Dhabi.

5. OUTCOMES ACHIEVED

Outcome 1: Increased skill development, entrants to the profession and innovation

Skills gained and applied

Across survey responses, focus groups and interviews, alumni consistently reported that the Challenge significantly strengthened both **professional and technical** skills relevant to the clean energy sector.

Essential workplace skills

Alumni widely cited the most valuable skills they developed during the Challenge as teamwork and collaboration, communication and delivering presentations, project management and problem solving. For many, it was their first opportunity to work collaboratively on a real design project with deadlines, budgets and user requirements.

Technical design and prototyping skills

Alumni survey respondents also reported gaining practical technical experience in renewable energy design, digital modelling software (e.g. AutoCAD, SolidWorks), testing and troubleshooting. Alumni focus group participants explained that analysing prototype performance and documenting results helped **“bridge the gap between classroom theory and professional practice.”**



Photo credit: Unsplash

Inclusive design

The Challenge intentionally emphasised inclusive design, requiring students to consider user needs, affordability and cultural context. Several participants highlighted that prior to the Challenge, their primary focus was on solving technical problems, but the Challenge taught them to design products that people would actually use. Educators commented that this approach broadened students' understanding of real-world constraints and pushed them to think beyond technical feasibility.

One mentor and a delivery partner felt that some teams were overly focused on technical prototyping at the expense of user-centred design, underscoring the importance of continued emphasis on market viability and inclusive design within design challenges.



Applying skills in studies, entrepreneurship and employment



100% of alumni survey respondents applied at least one skill gained through the Challenge in their studies or career since

All respondents have applied the skills they learnt during the Challenge in their studies or career since

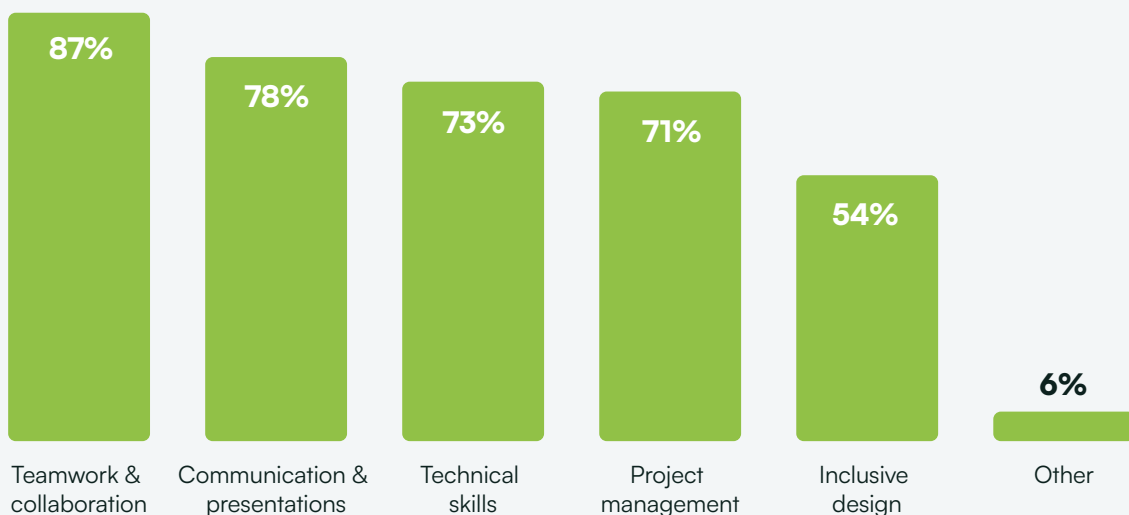


Figure 2: Skills learnt during the Challenge that have been applied by alumni participants in their studies or careers since. Respondents could choose more than one skill (n=148).

How alumni applied their skills

Figure 2, above, shows the skills most widely applied by alumni since the Challenge. Open survey responses, focus groups and interviews with alumni indicate that these skills were applied in four main areas:

1. Academic study

Participants drew on techniques learned within the Challenge for subsequent coursework and research - one explained how inclusive design principles from their prototype shaped their final-year engineering project on solar-powered greywater recycling.

2. Entrepreneurship

27 student teams have advanced ideas initiated during the Challenge through the Accelerator Programme, 14 of whom received pre-seed funding. Alumni described using skills they developed during the Challenge - particularly budgeting, communication and technical planning - to strengthen pitches, work with local communities and collaborate with investors. One team said of the experience: ***“It strengthened our technical knowledge of solar energy and improved the way we manage our start-up.”***

3. Employment in the clean energy sector

Participants applied teamwork, design thinking, project management and leadership skills in early career roles. Several said the Challenge gave them confidence and credibility during interviews because they could reference a real project they had designed and tested.

4. Networking and exchanges

A number of students participated in research exchanges or international collaborations, crediting the Challenge with strengthening their presentation and research capabilities.

“The Challenge was my eye-opener. It enabled me to interact with various energy experts, policymakers, and researchers who I have contacted since.”

Alumni focus group participant

Entry to employment

90% of alumni survey respondents are in employment, self-employment or studying

The Challenge has had a significant impact on helping participants access work, further studies or entrepreneurship, with only 10% of alumni survey respondents describing themselves as unemployed or seeking work, see Figure 3.



Figure 3: Employment status of alumni survey respondents (n=144). Respondents could select more than one option; some answers were re-stated.

Educators, mentors and delivery partners agreed that the Challenge effectively prepares participants to enter the clean energy workforce - whether through further study, employment or entrepreneurship. **The programme's blend of technical rigour, professional-skills training and applied learning was viewed as instrumental in building both competence and confidence, as well as giving students an advantage over other graduates in the employment market.**

“After the Challenge, students could confidently explain their project work in job interviews, and many have since been employed because of that experience.”

Professor Khosru Mohammad Salim,
Independent University, Bangladesh (IUB)



Photo credit: Unsplash

Careers in the clean energy sector

68% of alumni survey respondents are working or studying in clean energy

85% of those said that the Challenge influenced their choice of career

Delivery partners agreed that, while the Challenge's immediate outcomes are educational, its long-term value lies in influencing the talent pipeline for clean energy innovation. The programme has had a **significant influence on participants' ambitions and entry into the clean energy workforce**, with more than two-thirds of alumni survey respondents (74 out of 109) now working or studying in the sector - of those, **85% said the Challenge influenced their career choice.**

“The Challenge is the best pathway into green energy.”

Alumni focus group participant

Industry mentor, Omileye Toyobo, commented: ***“Global-facing engagements like this build confidence, develop both hard and workplace skills, and help young people think critically about their careers.”*** Several alumni participants described a sense of purpose and responsibility to address energy poverty in their own communities.

“Coming from a rural community where energy poverty is rampant, I want to strengthen my career by educating people about renewable energy ... The Challenge influenced my choice to undertake a Master of Science in Energy Technology.”

Alumni survey respondent

IMPACT STORY:



Applying skills in a clean energy sales engineering career

Peace Gracious Atim participated in the Challenge in 2023 during her final year at Gulu University in Uganda. As team lead, she and her colleagues developed a solution that integrated **solar and biomass heat sources into a domestic hot water system** designed to address reliability issues with solar water heaters during cloudy weather or at night. The team received specialised mentoring from an industry expert, which was *“inspiring.”*

“Getting support from an external person with experience from a different environment was very important ... they help you to realise what is possible ... this breeds more interest in the sector.”

Peace Gracious Atim, former Challenge participant from Gulu University, Uganda



Prototype of the solar water heater developed by Peace and her team participating in the Challenge

Peace’s team received funding to build their prototype using locally sourced materials. She described the experience as *“Very beautiful ... bringing our wild thoughts into reality.”*

Soon after completing her studies, Peace secured a position as a **Sales Engineer** with Davis & Shirliff International, a **major supplier of water and clean energy solutions across Africa**. She works in Arua, West Nile, and her customers include individual householders, government agencies and non-profits. **Her role involves designing customised solutions, preparing proposals, educating users on system operation, marketing renewable-energy products and supporting after-sales engagement.**

Peace attributes key aspects of her professional success to the skills and confidence gained through the Challenge. The programme strengthened her ability to understand user needs and design solutions in rural and low-income contexts. She explained that the Challenge’s emphasis on inclusiveness directly shaped her approach to customer engagement, teaching her to *“Listen proactively, understand the customer’s problem, and tailor the solution so it works for them”*.

Her participation in the Challenge also strengthened Peace’s confidence during job interviews. She said that **describing her project at the panel interview proved a decisive advantage**, particularly as her employer works in solar water heating systems. Today, Peace is committed to applying clean energy solutions in water access and rural electrification and aspires to support communities across Uganda and the wider region.

Koolboks: Real-world clean energy pathways

Koolboks, a solar refrigeration company with offices in Nigeria, Uganda and Kenya, has shown how the Challenge can lead directly to employment. **Five alumni secured a paid six-month internship with Koolboks** working on the Internet of Things (IoT), developing and testing smart solar-powered refrigeration systems that improve access to cold storage in off-grid communities.

The interns described the experience as an **“unexpected benefit”** of taking part in the Challenge. Koolboks’ Chief Business Officer and Challenge mentor, Natalie Casey, noted that such partnerships allow firms to **“Identify talent early - students who already think critically and understand both the technology and the market realities of clean energy solutions.”**



Photo credit: Unsplash

Clean energy internships and apprenticeships

23% of respondents are doing an internship or apprenticeship

Over a fifth of alumni survey respondents are currently doing an apprenticeship or internship (33 out of 144). Of those, **73% are doing their placement in the clean energy sector**. Alumni survey responses indicate that these opportunities were independently secured, helped by being able to talk about their design confidently, and sometimes through connections made during their participation in the Challenge.

The Efficiency for Access Design Challenge Internship Programme (outside of the scope of this evaluation) was introduced as an opportunity for recent graduates seeking experience in the clean energy sector to work on real-world projects, under the guidance of experienced professionals. Although the Internship Programme had limited success, five Challenge students from Nigeria were offered a six-month internship with Koolboks, a solar cooling company (whose Chief Business Officer is a mentor), as a result of their participation.

Entrepreneurship and innovation

36% of survey respondents are self-employed or running their own business⁴

More than a third of alumni survey respondents (52 out of 144) are transforming their Challenge experience into entrepreneurial ventures, as freelancers/self-employed, or by setting up their own businesses. Of those, **80% are working in clean energy-related ventures** (32 out of 40 who answered the question). Many said the Challenge gave them the confidence and business awareness to launch start-ups that address local energy issues that are not supported by the electric grid.

⁴ Results in Figure 3 (page 14) include respondents who selected multiple options for their employment status whereas the 36% figure, above, relates to respondents who stated that they were either self-employed or developing their own business.

IMPACT STORY

Team INESAM - Solar-powered cold storage for Rwanda's smallholder farmers

Team INESAM from the University of Rwanda has developed an innovative solar-powered cold storage system designed to reduce post-harvest losses and improve the livelihoods of smallholder farmers. Their project, **Precision Crop Preservation with Energy Efficiency and Affordable Solutions**, integrates solar energy, AI and IoT technologies to monitor crop storage conditions in real time and adjust cooling performance.

The system enables farmers in rural, off-grid areas to access reliable, low-cost refrigeration that protects produce quality and increases market value. Combined with a mobile delivery concept, the design addresses both storage and distribution challenges that contribute to food spoilage in Rwanda.



Victorien Ukurikiyimfura, project manager from Team INESAM, and their solar-powered cold room

As Project Manager, **Victorien Ukurikiyimfura** coordinated the prototype development and ensured user needs and sustainability goals were central to the design. Prototype funding through the Challenge, alongside support from the Africa Center of Excellence in Internet of Things (ACEIoT), enabled the team to progress from concept to building and testing a functioning prototype. Mentoring further strengthened their technical decision-making, budgeting and user-centred design.

Victorien described the Challenge as a turning point in his development. Applying sustainable engineering principles to a real agricultural problem deepened the team's understanding of how innovation can support rural livelihoods, and the hands-on experience shaped his ambition to pursue clean energy and agri-tech solutions.

Team INESAM plan to continue refining their system with the aim of scaling it across farming communities in Rwanda. For them, the Challenge provided both the technical grounding and the confidence needed to pursue long-term innovation in sustainable agriculture.

Skills gaps and areas for growth

While overall feedback was hugely positive, alumni participants identified several areas that would further strengthen their preparation for clean energy careers:

- **Software skills for the future:** Particularly programming and 3D printing, predictive energy simulations, AI integration, and data analytics (including MATLAB, Python and HOMER).
- **Technical skills:** Energy storage and battery management were highlighted as gaps.
- **Financial and business skills:** Some alumni participants said that they would like to learn additional business skills such as cost analysis, scalability modelling and entrepreneurship - partners recently added more business-focused webinars.

- **Policy and regulatory understanding:** One alumni participant highlighted the need for a greater link between design solutions and national electrification goals, ***“which would help bridge the gap between design concepts and practical implementation.”***
- **Community engagement methodologies:** To encourage a greater focus on inclusive design.

These insights highlight the potential to complement the Challenge’s design-focused curriculum with deeper technical and market-readiness content.

Outcome 2: Increased collaboration between industry and academia

Industry collaboration and pathways to employment

While the Challenge has successfully connected students with professionals in the clean energy sector, stakeholders highlighted that wider collaboration between academia and industry remains limited.

“We’ve seen more from the student-professional relationship than the academia-industry relationship ... although educators are keen, it’s been difficult to find mutually beneficial motivators.”

Tom Whitehead, Engineers Without Borders UK

Students, educators and mentors agreed that mentoring has been a highly valuable feature of the programme, providing real-world insights and exposure to professional practice.

Yet delivery partners argued that industry engagement could be deepened. Emilie Carmichael (Energy Saving Trust) suggested that ***“industry could even contribute to setting the challenge/s that student teams tackle”***, ensuring that student projects align more closely with sector priorities and workforce needs. This approach would ground students’ designs in the operational realities of the clean energy market, further emphasising their understanding of how innovation must respond to commercial, technical and social challenges.

Several interviewees described a mismatch between supply and demand in the clean energy workforce. While the Challenge has inspired and upskilled highly capable graduates, many of the companies operating in the clean energy sector are start-ups, with limited employment opportunities.

The dispersed, local nature of projects also makes it challenging to pair students or universities with nearby companies for internships or collaborative research. Whilst there is a need for technical, graduate-level skills in the sector, **“the greatest need is for non-technical, vocational skills in areas like sales, marketing and customer service”**, said Emilie Carmichael (Energy Saving Trust).

Nyamolo Abagi (CLASP) noted that students often struggle to find and interpret clean energy career pathways. She noted that **in more mature industries, companies attend career fairs and proactively recruit students; in the off-grid sector, this is rare.**

“In our sector, we can’t just expect people to know about us ... there’s a lot more brokering that needs to be happening.”

Nyamolo Abagi, Director of Clean Energy Access, CLASP

Nonetheless, there are promising examples of universities extending the Challenge’s collaborative ethos into new partnerships with industry.

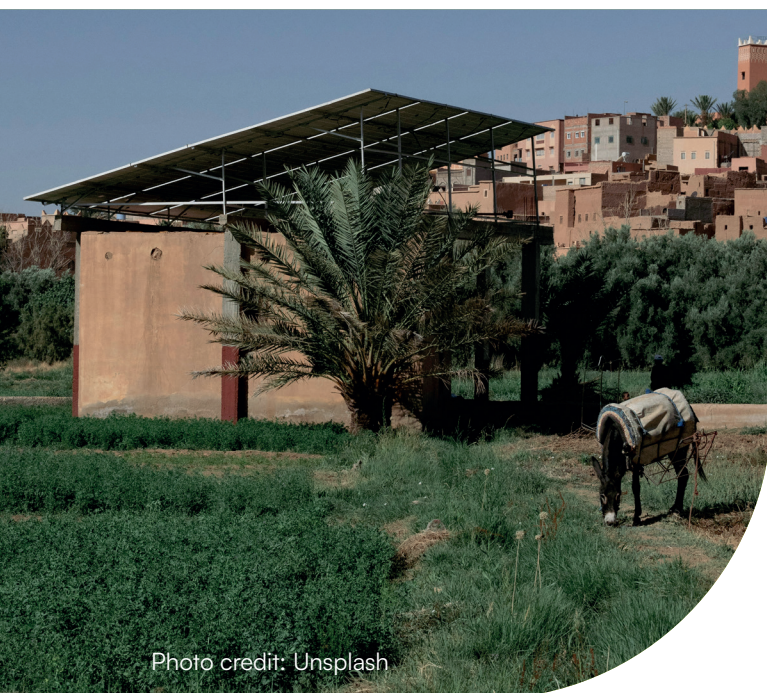


Photo credit: Unsplash

Inspiration for long-term industry partnerships

At **Aston University** (in the UK), educator **Dr Panos Doss** saw the potential of the Efficiency for Access Design Challenge to reshape how students collaborate with industry. Having observed how the Challenge encouraged teamwork, creative problem-solving and practical engagement, coupled with sustainability, Dr Doss developed a partnership with Severn Trent Water.

“I was able to take this beyond the Challenge and partner with Severn Trent Water, bringing that same approach and the value of experiential learning. It’s led to further collaborations, and we’re now looking across our whole portfolio of companies to do similar things with our students.”

The initiative has since inspired Aston University’s Faculty of Engineering to expand links with a range of employers, from small and local businesses to major utility companies, showing how the Challenge’s model can ripple outward - embedding practical learning connected to industry needs well beyond the programme itself.

Several stakeholders suggested practical ways to build on this progress. Locally brokered internships and applied research placements were seen as particularly promising mechanisms for bridging the gap between academic learning and professional practice. Some mentors observed that even small-scale opportunities can make a difference, providing students with the experience needed to enter the workforce. However, internship availability remains constrained by cost, scale, and the limited hiring capacity of clean energy start-ups.

Outcome 3: Research projects contribute to technological improvement and innovation

Teams are required to undertake research to develop their concept and designs; this has contributed to technological improvement and innovation in the following ways:

Technological improvement and onward career specialisms

Designs spanned a wide range of technologies, including **solar, agricultural processing, water treatment, irrigation, cooking, cooling, and IoT/AI**. This breadth of technologies is reflected in the subsequent clean energy specialisms of alumni survey respondents, as shown in Figure 4.



Top technical specialisms for alumni survey respondents who are working in clean energy

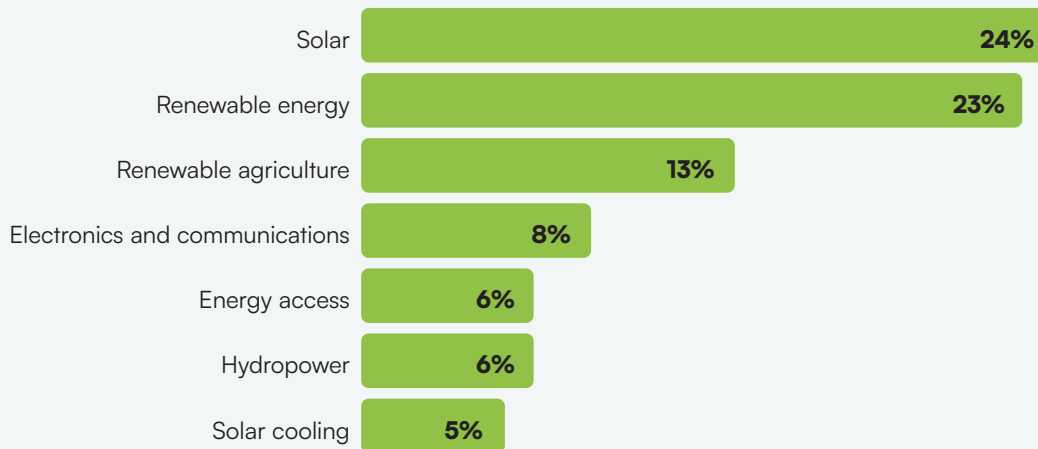


Figure 4: Most common clean energy specialisms of alumni survey respondents (categorised from open answers given by 62 respondents).

An innovation catalyst

Examples of ideas initiated within the Challenge, and then further developed through the Accelerator, include:

- A team from the University of Rwanda is progressing a **solar-powered cold room** into field pilots, later showcased at the Rwanda Agrishow.
- A team from Gulu University is advancing a **solar UV-C water treatment system now serving 2,500 schoolchildren** in rural Uganda.
- A team from Kalasalingam Academy is refining a **smart irrigation system currently being trialled with guava farmers** in India.

6. WIDER IMPACT

Educator skills and university curriculum change

The Challenge has not only built students' capacity but also had a demonstrable impact on educators and higher education institutions. Educators described how participating in the Challenge had strengthened their understanding of **project-based and experiential learning, enhanced their technical and mentoring skills, and influenced the pedagogical culture** within their universities.

Knowledge exchange and mutual learning

Educators who embedded a multidisciplinary approach described **reciprocal learning from students within different disciplines as one of the programme's most valuable aspects**. Working on diverse student projects exposed educators to new ideas, technologies and user contexts in energy access, agriculture and climate resilience.

Embedded project-based learning

Educators Dr Panos Doss (Aston University, UK) and Joseph Obbo (Strathmore University, Kenya) highlighted how the Challenge prompted a shift towards more open, facilitative teaching practices in their departments. Rather than directing students through pre-defined tasks, educators have learned to work across disciplines, **trust students to take ownership of their projects** and learn from their mistakes.

University-wide scaling of project-based learning

When Dr Panos Doss first introduced the Challenge at Aston University, it ran solely within his own programme. As he saw how the approach engaged students and developed their skills, **he began demonstrating its value to senior leaders and colleagues across the university**; this helped to secure support for a broader rollout. Design challenges are now embedded into the first year across the entire Faculty of Engineering, with 1,500 students.

Through this process, Dr Panos Doss developed a strong understanding of how to administer, run and integrate challenges within formal curricula. He has used this experience to advise other universities on embedding similar models, sharing practical insights on implementation and advocating for the wider adoption of project-based learning as a core part of engineering education.



Unintended outcomes

Although the Challenge was designed with clear objectives relating to student skills, innovation and career pathways, the evaluation also surfaced three wider positive unintended outcomes.

1. The introduction of the Efficiency for Access Accelerator programme

Delivery partners and Steven Hunt (FCDO) emphasised that the **Accelerator Programme**, introduced in 2023, represents an important and unplanned extension of the Challenge. The growing number of promising designs prompted the development of **a structured pathway that bridges learning and entrepreneurship**, helping teams progress towards market readiness.

2. Stronger community-university engagement

At Strathmore University, participation in the Challenge reinvigorated an existing community service initiative. Educators observed students becoming more active in engaging with local communities and applying user-centred methods introduced through the Challenge. A Strathmore graduate now acts as an intermediary between NGOs and the community, ensuring clean energy projects are grounded in local realities.

“As a result of the Challenge, we have seen students really engaging with communities ... projects now come from the community into the university, and then go back to the community.”

Joseph Obbo, Educator, Strathmore University

3. Organisational growth and opportunity for delivery partners

Emilie Carmichael (Energy Saving Trust) reflected that delivering the Challenge had deepened Energy Saving Trust’s understanding of **workforce and skills development needs**, particularly the barriers universities face in providing practical learning, linking students to industry, and sustaining prototype development. She noted that this experience has strengthened relationships with participating universities and improved insight into **what different institutions need to embed applied, hands-on learning and industry engagement**.

Steven Hunt (FCDO) added that the Challenge has also demonstrated added value by strengthening links across the TEA platform, enabling **closer coordination with the TEA Learning Partnership**, creating new opportunities for knowledge exchange and coherence across the TEA workforce-development portfolio.

The programme also produced positive ripple effects for Engineers Without Borders UK, **helping to expand its presence and build new partnerships in low- to middle-income countries**, creating a platform for forming relationships with new universities and Engineers Without Borders country partners.



7. HOW CHANGE HAPPENS

The mechanisms of change

The Challenge achieves its outcomes through a combination of **experiential and project-based learning, professional exposure and community connection**. Participants described a transformative process that begins with awareness and application and extends to capability, confidence and a commitment to a career in clean energy.

The key mechanisms of change identified across interviews and focus groups include:

- **Mentorship and industry exposure:** Participants consistently emphasised that mentoring was one of the most valuable aspects of the Challenge. Regular interaction with professionals helped them understand market realities, adopt user-centred thinking and gain confidence in presenting ideas.
- **Webinars and technical sessions:** The structured webinar series helped to build knowledge in a range of areas, including energy access, inclusive design and sustainability, creating a shared foundational understanding across regions and disciplines.

- **Global community and peer learning:** Participants described being motivated by seeing peers in other countries tackling similar challenges, which fostered a sense of belonging to a wider clean energy movement. Alumni focus group participants suggested they'd like more opportunities to connect with peers, including alumni from previous years who could become collaborators and mentors after graduation.
- **Project-based learning and prototype development:** Educators highlighted that the Challenge helps students develop technical and workplace skills and then apply them by solving real-world problems rather than theoretical exercises.

Dr Panos Doss at Aston University (UK) noted how the compounding effect of the programme's components resulted in excellent student engagement and learning.

“The learning that the students get from it is invaluable. I think the Efficiency for Access Design Challenge is an all-round excellent educational package and pedagogical framework. I hope it continues, even if it's in another form.”

Dr Panos Doss, Educator, Aston University

Through these interconnected mechanisms, the Challenge turns technical education into applied learning - equipping students not just with skills but also with a belief that they can drive change in their own countries and communities, and the motivation to act on it.

The value of prototyping

Prototyping at a glance

A prototype is a simple experimental model of a proposed solution used to test or validate ideas, design assumptions, and other aspects of a design quickly and relatively cheaply. Teams could apply for funding (from £1,000 - £1,500, depending on the year) to develop a prototype of their ideas - this was optional; teams were not assessed on prototypes, and they did not count towards their final score.

£94,000 was awarded over six years to 109 teams to develop prototypes

Across all stakeholder groups, prototyping was seen as a key benefit - it requires teamwork, iteration and resilience alongside technical competence. One alumni focus group participant described it as the moment where learning **“moves from imagination to impact”**. Educators emphasised the significance of grants to enable teams to develop prototypes, particularly in contexts where laboratory facilities are limited.

“Students are usually limited to theory and computer simulations, but prototype funding allowed them to build real systems.”

Professor Khosru Mohammad Salim,
Independent University, Bangladesh

Technical and practical learning

Industry mentor, Maria Namatovu, highlighted that prototyping gave students **“real experience of seeing designs fail, understand component limitations and adapt to user needs.”** Students explained that troubleshooting, sourcing materials and working to deadlines helped them develop analytical skills and confidence. Educators agreed, seeing the process as essential preparation for employment.

Design refinement and user-centred thinking

Building and testing prototypes helped students assess feasibility, affordability and appropriateness for real-world users. Teams often revised their design after early testing, demonstrating growth in inclusive design skills and awareness of costs.

“It’s one thing to have an idea, but another to execute it. When you build a prototype, you see the idea come alive and realise what needs to change.”

Alumni focus group participant

Strengthening employability

The prototyping process helped to strengthen essential workplace skills in teamwork, budgeting, communication and project management. Alumni participants consistently reported that **prototyping strengthened their employability**, describing how presenting a physical product or explaining the design process helped them stand out to employers and potential start-up investors.

Nyamolo Abagi (CLASP) explained that even imperfect prototypes **“plant the seed”** for future innovation by upskilling graduates who add value to the sector, even if their early ideas are not yet market ready.



Photo credit: Efficiency for Access

A pathway to entrepreneurship

The **Efficiency for Access Accelerator**, introduced in 2023, supports promising teams in moving from early design to minimum viable products (MVPs) through pre-seed funding and tailored mentorship. A participant described the Accelerator as the moment where you move from *“what if”* to *“what works”*. Engineers Without Borders UK similarly saw the Accelerator as a key mechanism for innovation: ***“Supporting the best teams through the Accelerator is how you move from good ideas to real innovation”***.

Barriers in prototype development

While prototyping was widely valued, the evaluation surfaced some constraints that limited progress:

- **Funding delays** compressed development timelines.
- **Infrastructure limitations**, including a lack of labs or fabrication tools; this required students to outsource work or improvise.
- **Limited post-Challenge support** (in earlier years) meant some promising ideas stalled once students graduated, which is why the Accelerator programme was developed.

Delivery partners acknowledged these challenges and worked to improve tracking and seed funding disbursement, but educators and students were clear that stronger local infrastructure and sustained post-Challenge support with prototypes would further enhance impact.

8. BARRIERS TO ENTERING THE CLEAN ENERGY SECTOR

Despite the rapid global expansion of clean energy, **the sector remains relatively young, unevenly developed and structurally constrained** in many countries. Across interviews, focus groups and survey responses, a consistent picture emerged: Challenge participants are motivated and skilled, but they and other students face **complex, intersecting barriers** that limit their progression into clean energy employment or entrepreneurship.

1. Limited job opportunities and sector immaturity

Alumni commonly reported a shortage of **entry-level jobs in clean energy**, particularly in sub-Saharan Africa and South Asia, where many renewable energy companies are small, early-stage and unable to recruit or train new graduates at scale. Alumni focus group participants said employers frequently seek candidates with prior experience in system design, modelling or project finance, but **“without structured internships ... it’s difficult to bridge this gap”**. Suggested solutions included **structured placements and bootcamps** co-designed by universities, industry and funders, to give students real-world experience.

Mentors added that job visibility is low:

many vacancies are informal, geographically dispersed, or embedded in global value chains rather than local markets. Interviewees highlighted the need for a **greater visibility of career pathways**, including targeted social media campaigns and **regional job-matching platforms** to connect employers with graduates.

Location also plays a significant role.

Employment opportunities tend to cluster in major cities, while many students come from - and wish to work in - rural areas

where energy poverty is most severe. Several respondents said graduates are reluctant to take lower-paid roles in remote areas without supportive training or incentives.

2. Structural, political and regulatory barriers

Barriers were frequently linked to **wider political and governance contexts**. Students and one educator described how weak regulatory environments and inconsistent energy policies slow market development down, suppress investment and attitudes to risk, and ultimately reduce job creation.

3. Financial barriers: capital constraints, high upfront costs and limited training pathways

Beyond start-up funding challenges, students described a broad set of financial barriers:

- **High upfront costs** for specialist equipment, certification or training.
- The **cost of accessing education in clean energy** itself, particularly where renewable-energy modules require additional payments or specialised placements.
- **Limited access to laboratory facilities, tools and software** during university study.

Many participants expressed an interest in entrepreneurship but said they lacked the capital to register a company, build a minimum viable product, or access incubation programmes. One Kenyan survey respondent summarised this succinctly: *“Most young graduates have the potential ... but lack funds and support.”*



Photo credit: Getty Images

4. Weak support and mentoring networks

While the Challenge provides mentoring during delivery, several alumni described a **lack of post-programme networks**, making it harder to access opportunities, refine prototypes or seek advice on their next steps. Several noted that they felt isolated when attempting to progress ideas alone. The Accelerator programme was introduced for this purpose. However, even Accelerator participants suggested that **more structured introductions to alumni and companies in their own country, those working on similar technologies, or regional peer-support networks** would help sustain motivation and improve access to opportunities.

“The Challenge gives us the skills; what we need next are the bridges - connections to the companies and investors who can help us use them.”

Alumni focus group participant

5. Market awareness, confidence and demand

Many respondents highlighted a **low level of public awareness** about clean energy and its benefits. This affects:

- Consumer confidence and market demand
- Employers’ willingness to invest in new roles
- Graduates’ own confidence in pursuing careers in clean energy

In several contexts, students described **risk aversion among communities and businesses**, driven by lack of information, low literacy levels, or mistrust of new technologies. This created uncertainty for early-stage innovators and reduced employment opportunities.

6. Graduate skills and experience gaps

While the Challenge strengthens technical and professional skills, many universities continue to provide **highly theoretical training**, with limited hands-on experience. This exacerbates the gap between academic preparation and industry requirements. Educators, mentors and alumni all highlighted graduate skills gaps in:

- Practical field exposure
- Customer engagement and market analysis
- System design and modelling
- Software and digital tools (particularly in solar energy)

“The most important skills in the solar energy area now are related to software design and modelling systems.”

Audrey Kakpohoue, Technique Director,
Nadji.Bi Senegal

As Professor Khosru Mohammad Salim from Independent University in Bangladesh noted, renewable energy education is still limited to **“very few universities”**, creating a **self-reinforcing constraint**: limited training reduces the supply of graduates, which restricts sector growth, which in turn limits incentives to expand training. Some educators suggested **updating university curricula to align with industry needs**, including practical hands-on, interdisciplinary training, field experience and applied project work.

7. Shortage of technicians and vocationally trained staff

Industry mentors and delivery partners stressed that a major constraint on clean energy expansion is the limited number of technicians and vocationally trained workers able to install and service systems in off- and weak-grid areas. Companies report difficulty recruiting staff with the hands-on capabilities needed for day-to-day operations. Workforce shortages restrict reliability, market growth and user confidence. Industry mentor, Tushar Devidayal, noted that his company had **“2,000 solar refrigerators and only six service technicians”**. Stakeholders consistently emphasised that this gap represents a **structural barrier**, and that vocational training programmes are needed in addition to university-level initiatives like the Challenge.

8. Barriers relating to gender discrimination

Research from **IRENA (2025)⁵** indicates a persistent “glass ceiling” that limits women’s influence in clean energy. Their research found that women’s representation in renewable energy is uneven across job categories, being highly concentrated in administrative and non-STEM roles, with only 19% of senior managers or board members being female.

Alumni focus group participants said that women face both **structural discrimination** within the sector (e.g. assumptions about capability and limited access to fieldwork roles) and **internalised barriers** (e.g. confidence gaps). A female Challenge graduate explained that **“some professionals still doubt women’s capabilities, while some women remain uninterested due to societal myths”**. They suggested more mentoring for women in clean energy would help to address confidence and opportunity gaps.

5 IRENA (2025), Renewable energy: A Gender perspective; Second edition, International Renewable Energy Agency, Abu Dhabi

9. CONCLUSIONS

The delivery

The Efficiency for Access Design Challenge is **highly regarded by all stakeholder groups and has met its core aims** throughout its six-year cycle. The programme has been established as a valued, well-run and collaborative initiative across multiple universities, particularly in sub-Saharan Africa and South Asia, where access to practical engineering experience is limited. Delivery partners, educators and students described warm, trusting relationships with Energy Saving Trust and Engineers Without Borders UK, noting the professionalism, responsiveness and clarity with which the programme was managed.

Although the Challenge attracts more engineering students than other disciplines, **the evaluation has shown the value of multidisciplinary teams**, which could be explored further in any future iteration. The Challenge's features — combining mentoring, webinars, prototyping, and a high-profile Grand Final — were consistently identified as strengths by educators, mentors and alumni participants.

The difference made

The programme has had a **clear and demonstrable impact on the skills, confidence and career progression of its participants**. Alumni consistently described the Challenge as a transformative learning experience, deepening their technical

capabilities, strengthening their professional and leadership skills, and exposing them to real-world clean energy challenges that are rarely addressed in academic curricula.

More than two-thirds of alumni survey respondents reported securing or creating roles in the clean energy sector. This is a significant indicator of programme effectiveness. Among those working in clean energy roles, **85% reported that the Challenge influenced their career choice**, a finding reinforced through interviews and focus groups.

The Challenge also fostered **a mindset of innovation and social responsibility**. Prototyping, in particular, enabled students to experience design iteration, user feedback and practical constraints. This led to tangible outcomes, including prototypes tested in schools, farms and communities, start-ups emerging from student teams, and **alumni using their Challenge experience to secure local, national and international employment or academic opportunities**.

The programme further **strengthened educators' ability to use project-based learning, encouraged interdisciplinary teaching, and influenced curriculum development across several faculties**. In at least one case, it contributed to a broader institutional shift towards greater community engagement and socially responsive engineering..

The contribution

The evaluation provides clear evidence that the Challenge has made **a meaningful contribution to the clean energy talent pipeline in low- to middle-income countries.**

While not the sole influence on career pathways, the Challenge has been a significant enabler, helping students to understand the breadth of the clean energy sector and to develop the confidence, skills and motivation needed to pursue roles within it.

The Challenge has also supported early-stage innovation. 27 student teams advanced ideas initiated during the Challenge into the Accelerator Programme, gaining access to technical assistance, pre-seed funding, and opportunities to pilot solutions in real-world contexts. With follow-on support through the Accelerator, the Challenge has **cultivated future innovators and system thinkers capable of designing solutions for off- and weak-grid environments.**

Beyond individual participants, the Challenge has strengthened clean energy education by **equipping educators, university departments and delivery partners with pedagogical approaches, networks and practical tools** that extend beyond the competition cycle. A distinctive aspect of this contribution has been its reach into universities with limited prior exposure to project-based learning.

The opportunity

The evaluation shows that the Efficiency for Access Design Challenge occupies a **distinctive and valued position within the wider international skills and learning ecosystem for clean energy.** Its strength lies in developing motivated, capable early-career innovators and in strengthening the institutional environments that support applied, socially responsive learning.

The evaluation suggests that the Challenge has the **greatest impact when learning is interdisciplinary, applied and connected to real-world contexts.** Strengthening engagement with industry and local communities could further ensure that student work reflects practical constraints and user needs, while deeper and more sustained alumni connections could help build longer-term clean energy networks beyond the Challenge itself.

The evaluation also highlights **wider workforce development needs that sit alongside, rather than within, the Challenge's scope.**

These include vocational and entry-level pathways, curriculum development, and stronger institutional links between universities and industry.

Taken together, the findings point to an opportunity to apply the learning from the Challenge to the design of future programmes across the clean energy ecosystem, ensuring that innovation, practical skills development and employment pathways are better aligned with the needs of communities, industry and universities.

10. APPENDICES

Appendix 1 - Glossary of Terms

Term	Abbreviation	Definition
Accelerator Programme		A post-Challenge support pathway offering selected student teams funding, mentorship and technical guidance to refine prototypes, test business models and progress towards market readiness.
Ayrton Fund		A UK Government commitment to fund clean energy innovation and research in developing countries. The Fund channels support to programmes including TEA and LEIA.
CLASP		An international non-profit organisation supporting improved energy efficiency and access to sustainable energy services. CLASP co-leads the Low Energy Inclusive Appliances (LEIA) programme and acted as a strategic partner for the Challenge.
Clean energy		The productive use of renewable or low carbon energy sources (e.g., solar, wind, micro-hydro and energy-efficient appliances) that reduce greenhouse gas emissions and improve access to modern energy services.
Efficiency for Access Design Challenge (the Challenge)		A global, project-based competition that supports university students to design affordable, energy-efficient appliances and enabling technologies, helping increase access to technologies for off- and weak-grid communities.
Energy Saving Trust		An independent organisation dedicated to promoting energy efficiency, low carbon transport and sustainable energy use. Energy Saving Trust is a delivery partner of the Challenge.
Engineers Without Borders UK		A UK charity leading the transition to globally responsible engineering, ensuring the profession meets the needs of both people and the planet. Engineers Without Borders UK is a delivery partner of the Challenge.
Foreign, Commonwealth & Development Office	FCDO	The UK government department responsible for overseas development assistance, including the Transforming Energy Access (TEA) platform and the Ayrton Fund. Co-funder of the Challenge.
IKEA Foundation		A strategic philanthropy that focuses its grant-making efforts on tackling the two biggest threats to children's futures: poverty and climate change. The Foundation is a co-funder of the Challenge.
Low Energy Inclusive Appliances Programme	LEIA	Efficiency for Access' flagship initiative. It is an innovative research, development, and demonstration programme. It seeks to improve the efficiency, performance, availability, and affordability of a range of household, community, and productive use electrical appliances and solar-powered technologies. LEIA is funded by the UK government via the Transforming Energy Access platform and the IKEA Foundation.

n=		A shorthand statistical term indicating the number of individuals or responses to a survey question or dataset (e.g. n = 152 means 152 people answered the question).
Off-grid		Energy systems or communities that are not connected to a national electricity grid. In many low-income settings, off-grid solutions include solar home systems, mini-grids and energy-efficient appliances.
Sustainable Development Goals	SDGs	A set of 17 global sustainability goals adopted by the United Nations.
Transforming Energy Access	TEA	A research and innovation platform supporting the technologies, business models and skills needed to enable an inclusive clean energy transition.
Transforming Energy Access Learning Partnership	TEA-LP	A global partnership of universities that runs Master's programmes to upskill the next generation of energy leaders and support professionals already shaping the sector.
Workforce or Clean Energy Workforce		The group of professionals and workers involved in the development, deployment, operation, and maintenance of technologies and services that produce or use energy from renewable or low-carbon sources.

Appendix 2 - Further details on the evaluation

About the author

Insley Consulting specialises in helping charities and social purpose organisations to understand, evaluate and communicate their impact. Founded in 2010 by **Emma Insley** - who has over three decades of experience in the voluntary sector, including as a charity CEO, fundraiser and grant assessor - the consultancy brings deep expertise in evaluation and organisational development.

Insley Consulting has worked alongside Energy Saving Trust and Engineers Without Borders UK to evaluate the Efficiency for Access Design Challenge. Our role has been to provide independent evaluation, ensure findings are grounded in evidence, and help partners use learning to consider the next steps for the Challenge and its legacy.

Key evaluation questions

Evaluation questions, outlined below, were developed with the Challenge partners.

1. **Process:** How has the Challenge evolved over the last six years?
2. **Reach:** Who has the Challenge reached, and to what extent do stakeholders believe these students have the potential to contribute to the clean energy workforce and future innovation?
3. **Intended outcomes:** To what extent is the Challenge achieving its intended outcomes, and what role did the Challenge play in this?
 - Increased skill development, entrants to the profession and innovation.
 - Increased collaboration between industry and academia.
 - Research projects contribute to technological improvement and innovation.

4. **Prototype development:** What has been the value of prototype development for participants in terms of skills, innovation, and career/entrepreneurship opportunities?
5. **Barriers:** What are the key barriers that students face to entering and staying in the clean energy sector (e.g. gender, country, systemic constraints), and how could these be addressed?
6. **Wider impact:** To what extent have educators gained or applied new skills through the Challenge, and how have they cascaded these within their institutions?
7. **Wider impact:** What unintended outcomes or ripple effects (positive or negative) have emerged from the programme?
8. **Recommendations:** What recommendations could strengthen the skills, knowledge, mindsets, and aspirations of students, thereby increasing their entry into and advancement/innovation within the clean energy workforce?

Evaluation methods

We developed a mixed-methods approach to the evaluation, underpinned by an Evaluation Plan that was developed with partners. This enabled a balanced understanding of the programme's performance, longer-term outcomes and contribution to the clean energy workforce, combining numerical evidence with personal accounts and stakeholder perspectives.

Evidence was drawn from:

- A review of six years of programme documentation and monitoring data provided by Energy Saving Trust.
- An online survey, sent to 672 alumni students, which generated 152 usable responses (although not all questions were

answered by all respondents). This gives us a **low 7% margin of error** (meaning that if 70% of respondents agreed with a statement, it is likely that between 63% and 77% of the wider participant group would also agree). See over for an overview of respondent backgrounds.

- Semi-structured interviews with one funder, four partner representatives, four educators, six industry mentors and four alumni (one via email due to connectivity issues). See over for a list of interviewees.
- Two focus groups with nine Challenge alumni, including participants from the Accelerator Programme.

Data was collected and analysed independently by Insley Consulting, with findings verified through consultation with delivery partners.

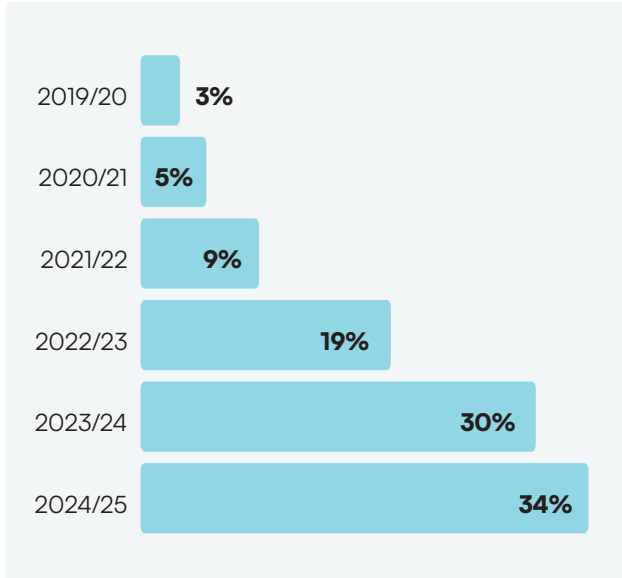
Evaluation limitations

The evaluation was conducted retrospectively as a summative evaluation, and not all alumni could be reached, particularly from earlier cohorts. Survey responses from alumni in USA and Europe were also low (just four respondents). Self-reported data may also reflect recall bias or a higher response rate among more engaged participants.

To address these limitations, the evaluation triangulated findings across multiple datasets and respondent groups to build a credible and balanced assessment of the programme's outcomes and legacy.

Alumni survey respondents

When they participated in the Challenge



Where they studied

We received responses from students who participated at 28 of the 42 universities involved since 2019.

Country	% of respondents
Bangladesh	6%
Benin	1%
Cameroon	1%
Ethiopia	1%
India	9%
Kenya	15%
Nepal	3%
Nigeria	13%
Pakistan	2%
Rwanda	16%
Senegal	2%
Uganda	16%
UK	3%
Zimbabwe	13%
Grand Total	100%

Interviewees

Name	Role	Organisation	Involvement
Dr Panos Doss	Associate Dean - Education & Student Experience	School of Engineering & Innovation, Aston University	Educator
Nyamolo Abagi	Director of Clean Energy Access	CLASP	Partner
Dr Omileye Toyobo	Associate Director	Clinton Health Access Initiative	Mentor
Peace Gracious Atim	Sales Engineer	Davis & Shirtliff International	Alumni Participant
Tushar Devidayal	Founder and CEO	Devidayal Solar Solutions	Mentor
Emilie Carmichael	Head of International	Energy Saving Trust	Partner
Tim Wilson	Universities and Partnerships Lead	Engineers Without Borders UK	Partner
Tom Whitehead	Programme Manager	Engineers Without Borders UK	Partner
Prof. Khosru Mohammad Salim, PhD	Dept. of Electrical & Electronic Engineering	Independent University Bangladesh	Educator
Maria Namatovu	Programs Associate	Innovex Uganda	Mentor
Natalie Casey	Chief Business Officer	Koolboks	Mentor
Afsana Sharmin	Doctoral Researcher	Loughborough University	Alumni Participant
Audrey Kakpohoue	Technique Director	Nadji.Bi	Mentor
Nidhi Pant	Co-Founder	S4S Technologies	Mentor
Joseph Obbo	Doctoral Fellow	Strathmore University	Educator
Victorien Ukurikiyimfura	Project Manager	Team INESAM, University of Rwanda / ACEIoT	Alumni Participant
Steven Hunt	Senior Energy Innovation Adviser	UK Foreign, Commonwealth and Development Office	Co-funder
Prof. Misbahu Ladan Mohammed	Head of Department of Energy and Applied Chemistry	Usmanu Danfodiyo University, Sokoto, Nigeria	Educator
Shaveen de Almeida	Energy Analyst	Welsh Water	Alumni Participant

“I am passionate about renewable energy and wanted to gain practical experience beyond the classroom - to apply my knowledge to real-life problems affecting off-grid communities ... The Challenge shaped how I think about my future and I am now working as an intern in solar energy.”

Alumni focus group participant

**For more information about the
Efficiency for Access Design Challenge:**

Visit: efficiencyforaccess.org/program/efora-design-challenge/

Or contact: EforAchallenge@est.org.uk

