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Revolutionary clean cooking fuel: German-South African green initiative takes aim at climate change and energy access



A global green fuel partnership between Germany and South Africa empowers Africa and paves the way for a sustainable world. Photo: Supplied

One-third of the world's population lacks access to clean household energy, with nearly one billion of these people living in sub-Saharan Africa; where over 80% of the population depends on traditional fuels for cooking and heating.

These emerged during the recent session hosted by the University of Cape Town's (UCT) [Catalysis Institute](#), who welcomed the German Federal Ministry of Education and Research (BMBF) state secretary, Professor Dr Sabine Döring in a visit focused on providing an update on the progress of the BMBF-funded GreenQUEST clean household fuel project.

Nearly one billion of the world's population without access to clean household energy who live in sub-Saharan Africa are forced to rely on fuels such as biomass (e.g wood), coal, and kerosene to cook and heat their homes.

Although these fuels are cheap and accessible, they're inefficient, and highly polluting. When burned, these combustibles produce a mixture of soot and smoke. This causes a variety of illnesses, and ultimately results in nearly four million premature deaths worldwide each year.

In sub-Saharan Africa, over 80% of the population depends on these traditional fuels for cooking and heating, posing a significant challenge. Women and girls bear the brunt, as they are often tasked with gathering and preparing fuel, as well as for cooking meals. In addition to the adverse health impacts, gathering these fuels significantly reduces the time available for education and other productive activities. It also drives deforestation and soil erosion, accounts for 20% of all anthropogenic carbon dioxide emissions, and often creates safety risks for women and girls.

While this is clearly a pressing issue, fortunately – as proven by the GreenQUEST project – the problem is not insurmountable.

From fossil fuels to green energy for Africa

Professor Jack Fletcher of the UCT Catalysis Institute, which forms part of the Department of Chemical Engineering in the Faculty of Engineering & the Built Environment, pointed out that action has been taken to transition users across Africa to one clean energy source in particular. However, he noted that the solution is not without its issues.

"What we're already seeing on the African continent, and probably elsewhere in the world, are moves to switch these communities to clean fuel. That fuel usually turns out to be liquified petroleum gas (LPG). It's clean burning [and] it's efficient; but it is, of course, still a fossil fuel," he said.

Understanding that LPG is appealing not only because of its excellent heating capacity but also because of the wide availability of LPG-compatible cooking equipment, the team behind the GreenQUEST project set out to develop a viable, sustainable green fuel product that could supplement and eventually replace LPG.

"GreenQUEST seeks to provide a green, clean fuel equivalent to fossil LPG. We do this by taking carbon dioxide captured from the atmosphere and combining it with green hydrogen, which we get from renewable wind and solar energy, to make a fuel that is essentially equivalent to LPG except that it is not a fossil-based fuel," Fletcher continued.

"Our aim is that green liquified fuel gas, which we call LFG or gLFG, would supplant fossil LPG to bring all the same benefits, but in an essentially carbon-neutral manner, in keeping with global net-zero targets."

Interdisciplinary innovation

GreenQUEST was born from the realisation of the positive effects of using clean and cost-effective fuels, on society, the environment and the economy. Apart from developing the green LFG, it now seeks to better understand the implications of introducing this new type of energy carrier into society.

Dr Tobias Sontheimer, the head of the strategy department for Energy and Information at the Helmholtz-Zentrum Berlin (HZB), pointed out that the project's multidisciplinary approach is key to developing a viable, sustainable green fuel product.

"Global energy challenges are complex and interconnected, and individual disciplines cannot address them. Therefore, interdisciplinary research is imperative. GreenQUEST seamlessly integrates technology development [and] economic and environmental analysis with social outreach," he explained.

"This unique consortium develops feasible pathways for producing green LFG in Southern Africa. The technological work is deeply integrated into an in-depth assessment of the economic, environmental and social dimensions along the entire green-LFG value chain."

United against climate change

Just as crucial as transdisciplinary research in tackling climate change and social issues, said Sontheimer, is international cooperation.

"Global collaboration is crucial in addressing the monumental challenge of climate change. By taking advantage of these opportunities for global partnerships, countries can work together to create a sustainable future for all.

"Accelerating the development of sustainable energy solutions to match the urgency of tackling climate change demands investment in clean energy research and innovation. It also builds on having collaborative partnerships globally to boost the impact of these investments," he said.

As a joint South African–German project funded by the BMBF and shaped by the inputs of more than 50 scientists in the two countries, GreenQUEST strengthens the relationship between the two nations.

"The GreenQUEST project will strengthen existing and enable new partnerships between South Africa and Germany. It will also contribute to establishing a lasting strategic alliance in a crucial research area within the German and South African governments' National Hydrogen Strategy frameworks," added Sontheimer.

In the same vein, Döring pointed out that the cooperative approach driving GreenQUEST has the potential to positively impact communities not only on the African continent, but also around the world.

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