

# WELCOME TO QANDU-QANDU!



Aerial view of Qandu-Qandu



Illegal electricity connections

## WELCOME TO QANDU-QANDU!

Our project team works in Qandu-Qandu, an informal settlement of 3,500 self-built households founded in 2018 in the partially informal Khayelitsha area of Cape Town. Households are constructed out of available or discarded materials such as metal sheeting, wood, and bricks. The settlement is located on low-lying land that is prone to regular flooding.

Much of Qandu-Qandu is not connected to the electricity grid. Energy sources used by residents include illegal (and therefore generally unstable and unsafe) grid connections, charcoal, paraffin, and diesel for use in portable generators.

All energy sources, fuelled by fossil fuels, are burned within and near the poorly ventilated shacks that are the community's housing stock. This poses significant risks to personal and community safety from shack fires, and domestic emissions-related health risks such as asthma and Chronic Obstructive Pulmonary Disease (COPD). Illegal connections also create fatal electrocutions (especially when children step on high-voltage, unsheathed cabling in muddy conditions).

Wellbeing of residents is negatively affected by them having to navigate through the availability (or lack) of non grid forms of energy, including their high cost. Women and children bear the brunt of these risks and hazards, as they tend to spend more time in the settlement, and in and around shacks.

## INFORMAL SETTLEMENTS: WHERE IS THE STATE?

The apartheid era of state-organised racial segregation in South Africa ended in the early 1990s. Multiracial elections led to Nelson Mandela being elected president in 1994. One of South Africa's success stories after 1994 was its expansion of electrification across the country. In 1996, 58.2% of the country was electrified: this had risen to 85% by 2011<sup>1</sup>.

Despite the success of electrification, more than 3 million households still do not have access to electricity: in cities, these are mostly households in informal settlements. National policy and planning guidelines state that dwellings illegally built on private or unstable lands, or in areas such as floodplains where urban residential development may be banned, cannot be electrified. However, these are exactly the areas where informal settlements are built.

During the apartheid era in South Africa, electricity was mainly supplied to the White population, with townships and other areas left unconnected or underserved. Informal settlements today house mostly Black residents, and in many ways this situation (with the poorest Black urban residents unable to access the electricity grid) is uncomfortably reminiscent of inequalities in energy access that were common during the apartheid era, despite broadscale change in South African cities. The current situation leads to worrying realities, such as Qandu-Qandu, where the grid runs through the settlement but provides no power to it.



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Co-Producing Innovative and Disruptive Off-Grid Energy



Co-Producing Innovative and Disruptive Off-Grid Energy Services

<sup>1</sup> See Essex, S. and de Groot, J. (2019). Understanding energy transitions: The changing versions of the modern infrastructure ideal and the 'energy underclass' in South Africa, 1860–2019. *Energy Policy*, 133 (October 2019). <https://doi.org/10.1016/j.enpol.2019.110937>.



## WHO ARE WE?

We are a team of geographers, energy researchers, engineers, and social scientists at Exeter University and University of Cape Town led by Prof. Federico Caprotti (University of Exeter) and Dr. Jiska de Groot (University of Cape Town). Although the project is academic-led, we work in partnership with solar energy utility Zonke Energy, who design and operate the project's solar minigrids (<https://zonkeenergy.com/>); the Thrie Energy Collective sustainable consulting agency (<http://www.thrienergycollective.com/>); and Story Room, a business and entrepreneurship incubation and acceleration firm (<http://www.storyroom.co.za/>). But the project would not even have started were it not for our key project partner: the Qandu-Qandu community. Because our work is not about 'parachuting' expertise from 'elsewhere' into an informal settlement, but co-producing solutions with the community.



- 1 Solar towers from above
- 2 A freezer being installed and connected to the solar mini-grid
- 3 No grid access in Qandu-Qandu
- 4 The electricity grid running through unelectrified Qandu-Qandu





## WHAT WE DO

As a project team, we aim to deliver clean, safe, and reliable energy via solar mini-grids in Qandu-Qandu, Cape Town. This is a highly innovative approach, which has yet to be tried and tested, implementing solar mini-grids in informal settings in South Africa.

We also provide 21 fridges and provide business support for female entrepreneurs, with the aim of creating sustainable local livelihoods.



A solar tower being installed in Qandu-Qandu

## SOLAR ENERGY IS COOL: CHALLENGES AND SOLUTIONS

**CHALLENGE 1** The first challenge faced by the Qandu-Qandu community, and therefore by our project team, is the issue of electrification. How can an informal settlement community be electrified with safe, reliable, and stable electricity?

**SOLUTION** The solution we are working on is based on solar mini-grid technology, which is far safer than burning fossil fuels or using illegal connections. The mini-grids we have installed in Qandu-Qandu are based on solar towers, which feature a solar photovoltaic (PV) panel: some of the towers also have battery units below the panel, for storage. Households are connected to the solar tower via aerial cabling. Through Zonke Energy, various different energy packages are offered to residents. These enable basic electricity provision for uses such as lighting, phone charging, and radio and TV use.

**CHALLENGE 2** The second challenge was that although fossil fuel sources could be used to power lights, TVs, and radios, fridges required a stable and reliable energy service, which could not be achieved using illegal connections. Refrigeration is a need that is not often recognised in the international development, aid, or energy literature on informal settlements: the focus is still on basic service provision. But refrigeration is enormously beneficial: it enables the longer-term storage of perishable food; the storage of medicines; a higher quality of life and sense of wellbeing; and it reduces the need for community members (usually women) to walk long distances, every day (especially in summer), to source food. However, a key part of the refrigeration challenge is also affordability: most Qandu-Qandu residents simply cannot afford to buy a fridge, let alone afford to operate it.

**SOLUTION** The solutions we devised are based on training women to run businesses based on fridges (what we call 'productive use appliance businesses'). That way, the fridges can be used to generate income. Through project partner Story Room, we developed and delivered a bespoke entrepreneurship training and mentoring programme that ran in 2021–22 for 100 local women. Through this programme, we were able to kick-start 20 businesses, ranging from standalone fridge businesses to enabling existing businesses (such as a local nursery) to run a fridge. This enables us to overcome the affordability issue. The technical issues around enabling mini-grids to run fridges were tackled by our partner Zonke Energy, who designed and installed several mini-grids with enough power capacity to power direct current (DC) fridges and fridge-freezers.

**CHALLENGE 3** The third challenge we faced was developing a finance model to ensure the utility could continue to provide safe and reliable energy in Qandu-Qandu, while also ensuring the community could continue to pay for energy services. Both finance and a long-term project perspective are key to ensuring the project can be reproduced and expanded over time, and to ensure that access to safe, clean, and affordable energy continues beyond the lifetime of the project.

**SOLUTION** The solution we developed involved working closely with the community throughout the lifetime of the project to identify their average household income and what they would be willing to pay for energy and refrigeration services. These findings were factored in to the utility's finance model, as were opportunities for generating sustainable livelihoods through energy services. This includes the 20 refrigeration businesses, among others.

## Research articles

Caprotti, F., de Groot, J., Bobbins, K., Mathebula, N., Bulter, C., Moorlach, M., Schloemann, H., Densmore, A., and Finlay, K. (forthcoming). *Rethinking the off-grid city, online. Urban Geography*.  
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## Project partners

The University of Exeter: <https://www.exeter.ac.uk/>  
The University of Cape Town: <http://www.uct.ac.za/>  
Zonke Energy: <https://zonkeenergy.com/>  
Thrie Energy Collective: <http://www.thrienergycollective.com/>  
Story Room: <http://www.storyroom.co.za/>

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