Relief Housing Units (RhuCube)

Submitted By: WR Christie Centurion



Organization Profile

Organization Name: WR Christie Centurion

Organization Type: Private sector

Website: https://www.wrchristie.net/

Practice Details

Country(ies): South Africa, Kenya

City(ies): Pretoria, Nairobi

Start Year: 2020 **Ongoing:** Yes **End Year:** N/A

Main Adequate Housing Components:



Housing Thematic Areas:

- Housing in Crisis & Displacement Contexts
- Housing & Climate Mitigation
- Technology & Digital Solutions in Housing

Relevant SDGs:



UN-HABITAT

Problem & Context

Refugee and low-income households often spend years in shelters designed only for emergencies. Tents and improvised huts deteriorate within months, leaving families exposed to heat, rain, insecurity, and health risks. Frequent replacement creates high costs, waste, and dependency while never meeting standards of safety or dignity. Transitional programs, such as cash-for-shelter, remain underfunded and inconsistent, producing fragile mud or iron-sheet dwellings that fail to last. The gap lies between humanitarian “temporary shelter” and long-term housing: existing policy frameworks prioritise short-term fixes but lack scalable, durable solutions that integrate resilience, cultural fit, and sustainability. This housing deficit undermines well-being, self-reliance, and settlement planning.

Solution Developed

The RhuCube is a modular, prefabricated housing unit designed to replace short-life tents and fragile huts with dignified, long-lasting homes. Built from engineered wood-resin composite panels, each unit is flat-packed, easily transported, and assembled in 4–6 hours by small teams, including refugees themselves. Target beneficiaries are displaced families, vulnerable households, and long-term camp residents who require durable, secure housing that meets international standards. The objectives are to provide safe, weather-resistant homes with a 10–20 year lifespan, reduce the cycle of repeated tent distribution, lower environmental impact, and create local livelihood opportunities. By integrating local manufacturing, the model also strengthens host–refugee economies and supports inclusive settlement planning. Innovations include: technological – recyclable composite panels offering insulation, fire safety, and modular expandability; social – participatory assembly and refugee-led construction teams to ensure ownership and skills transfer; and institutional – aligning shelters with national development plans, transforming shelter from a recurring cost into a durable community asset.

Implementation

Implementation began with a pilot phase of 100 modular units in refugee settlements to test feasibility, gather user feedback, and refine logistics. Actions included site preparation, training of refugee assembly teams, local community engagement, and establishing a micro-factory to produce panels using recycled biomass and plastics. Units were assembled in days, with handover to vulnerable families and ongoing monitoring of performance, safety, and cultural fit.

Actors involved: UNHCR and local authorities facilitated site selection and beneficiary targeting; refugee and host community groups participated in assembly and training; WR Christie Centurion and Bushtec Originals provided design, technology, and technical oversight; county governments aligned the project with local development plans; universities and vocational institutes hosted pilot production facilities; private sector suppliers contributed equipment and inputs.

Timeline: Planning and design (7 months); pilot deployment and training (4 months); evaluation and adjustments (ongoing); scale-up envisioned within 12–24 months, with expansion to 10,000+ units.

Resources & partnerships: Initial funding came through humanitarian shelter budgets and private investment, supported by partnerships with technical institutes and local authorities. The model anticipates scaling via blended financing, procurement, development bank support, and CSR, combined with reinvestment of cost savings from reduced imports and shipping.

Enablers & Obstacles

1) Strong alignment with Kenya's Shirika Plan and county development strategies provided political support, while UNHCR facilitated integration with settlement planning. Community engagement was critical; refugees participated in assembly teams, ensuring ownership and skills transfer. Technological enablers included modular, recyclable composite panels and mobile factories enabling local production. Partnerships with universities and private sector suppliers expanded technical capacity.

2) Initial challenges included high upfront costs, limited local manufacturing infrastructure, and logistical constraints in remote camps. These were addressed by piloting small-scale containerised factories, blending humanitarian and private financing to cover startup costs, and training local teams to reduce reliance on external contractors. Cultural adaptation and user acceptance were also tested through participatory design feedback, ensuring shelters met privacy, safety, and lifestyle needs.

Results & Impact

1) Pilot deployment of 100 RhuCube units provided dignified housing for ~600 people. Assembly time averaged 4–6 hours per unit, validating rapid deployment. Each shelter offers 17.3 m² floor space, meeting Sphere standards, with an expected lifespan of 10–20 years. Lifecycle costs were reduced by 40–50% compared to tents and cash-for-shelter models, while local micro-factory production demonstrated savings of over USD 1M annually in shipping.

2) Women-headed households and persons with disabilities benefited from lockable doors, solid walls, raised floors, and culturally adaptable layouts that increased safety, privacy, and accessibility. Stable housing reduced risks of gender-based violence, provided children with secure spaces to study, and improved resilience to heat, storms, and flooding.

3) The practice created jobs and skills pathways for refugees and hosts through training in assembly and production, fostering local income generation. Eco-impacts included reduced deforestation, recycling of biomass and plastics into durable panels, and a circular model that reuses materials at end-of-life. Socially, model "RhuCube villages" improved dignity, cohesion, and settlement planning, laying the foundation for integrated communities. In the long term, the

shift from disposable tents to durable housing converts shelter from a recurring cost into an asset that supports self-reliance, reduces aid dependency, and contributes to local development and climate resilience.

Replication & Scale Up

Yes. Following the pilot of 100 units (~100 households) in Kakuma/Dadaab, the model is being scaled to 10,000 units, targeting ~50,000 people. Key factors enabling replication include the modular design (easily adaptable to different contexts), mobile containerised factories for local production, and strong alignment with policy frameworks (e.g. Kenya's Shirika Plan). Community participation in assembly and training ensures cultural fit and ownership, while cost savings from reduced imports make the model financially sustainable for wider roll-out.

The RhuCube can be scaled by establishing regional production hubs capable of manufacturing up to 100,000 units annually. Mobile container factories reduce logistics costs and enable local job creation. Partnerships with governments, UN agencies, and development banks can finance scale-up, while standardised flat-pack kits allow rapid deployment across multiple contexts. Integration into settlement planning ensures flexibility; units can serve as homes, clinics, or schools, expanding both scope and reach sustainably.

Policy Uptake

This housing practice is a new or innovative practice that is not yet adequately or fully integrated into formal policy frameworks.

Embed modular housing into national shelter strategies as a standard for protracted displacement and low-income housing. Integrate RHUs into urban planning and county development plans to support transition from camps to settlements. Establish procurement guidelines that prioritise durable, recyclable shelters over tents. Support local manufacturing incentives and training programs to create jobs and reduce costs. Align with SDGs, climate, and housing policies to ensure long-term adoption.

Lessons & Takeaways

In hindsight, earlier integration of user feedback during design would have streamlined cultural adaptation. More emphasis on pre-financing mechanisms could have accelerated scale-up and reduced delays. Logistics in remote areas highlighted the need for stronger local supply chains from the outset. Future iterations will also focus on enhancing energy integration (solar, cooling) and simplifying assembly guides for vulnerable households, ensuring greater inclusivity and faster deployment.