



LOW IMPACT HIGH CREATIVITY

A greener approach to housing has seen two innovative answers to the housing shortage lay foundations in the Western Cape.

WORDS KAREN JAYES IMAGES SUPPLIED



The housing sector is seeing the development of several new affordable home designs. In acknowledgement of the issues that plague the low income housing sector in particular, those behind the new dwellings have developed them alongside innovative financial models to facilitate home ownership. The Empower Shack 2.0 and the Umnyama Ikhaya container pod home are two such prototypes – aimed at slightly different income groups. Both are on their way to gaining official approval as alternative housing types. A Memorandum of Understanding is under review between the City of Cape Town, Ikhayalami and the Swiss Federal Institute of Technology regarding the further development of Empower Shack 2.0s, and the Umnyama Ikhaya container pod home was at the time of writing on its way to gaining Agrément certification, having been advised to do so by the City of Cape Town.

Umnyama Ikhaya, the company behind the container pod home built from up-cycled used shipping containers, has signed an agreement with GreenFin to assist future home owners to pay for the units, and facilitate green technology. “We offer 99-month unsecured loans with no deposit,” says Umnyama Ikhaya CEO John Venter. “We will also offer 20-year mortgages very soon. It will include pods

and land, with the location to be decided in the third quarter of 2016. Families will then qualify on single or joint income under R12 000 a month. Two- and four-sleeper pods fully kitted for off-grid living will sell, land inclusive, for between R450 000 and R600 000.” Designs can also be customised and scaled according to individual requirements.

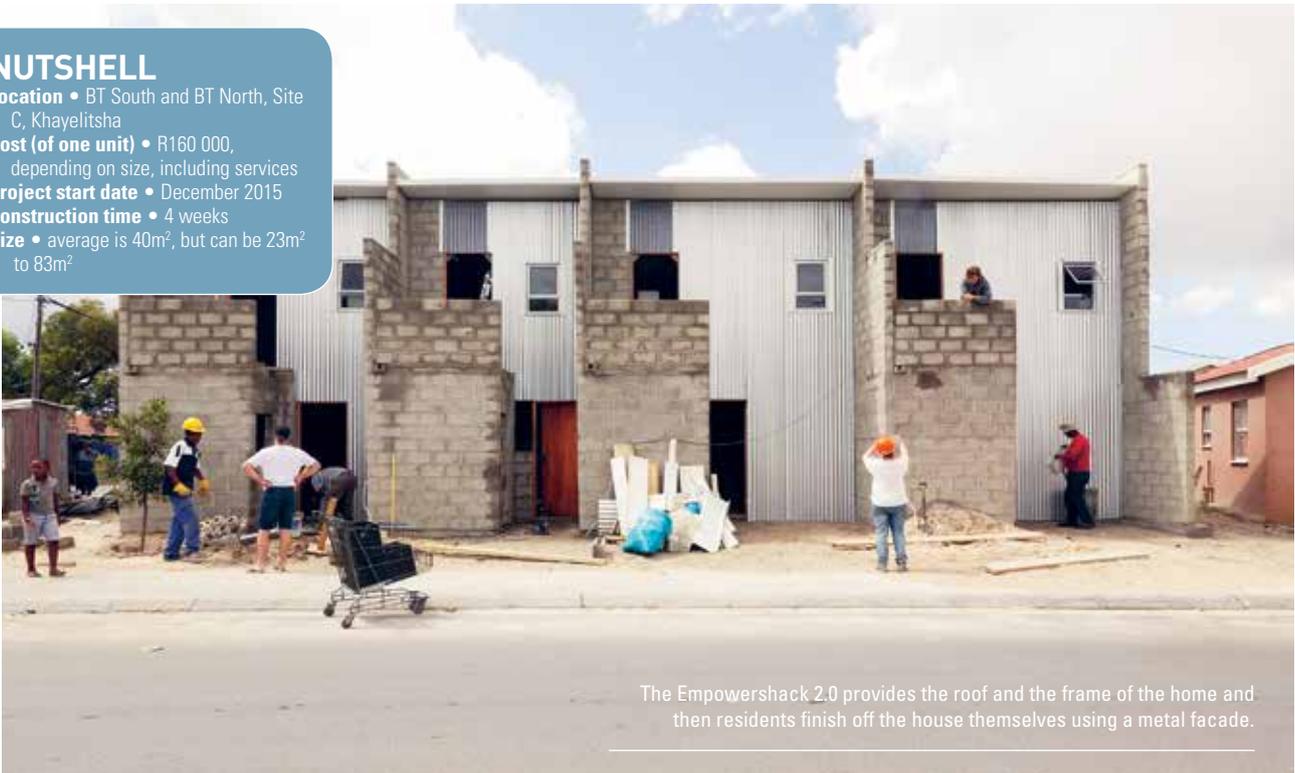
THE EMPOWER SHACK 2.0

The Empower Shack 2.0 is a low-cost structure made of mixed brick and mortar, and corrugated iron components – an example of what the Urban Think Tank team behind architects Alfredo Brillembourg and Hubert Klumpner term “incremental building to compliance” – and designed in partnership with community organisations. Having been completed in BT South, Site C, Khayelitsha, four units are awaiting connection to sanitation services.

Home ownership in this case is facilitated through linking individuals to cluster micro-financing, formalising a rental market through cluster associations, and introducing a Land Release Credit concept, where one resident will trade land for credits, in the form of discounts on the house, in return for releasing land to another resident. Fifty percent of the total cost is funded by a grant currently provided by a Swiss Re-insurance

NUTSHELL

Location • BT South and BT North, Site C, Khayelitsha
Cost (of one unit) • R160 000, depending on size, including services
Project start date • December 2015
Construction time • 4 weeks
Size • average is 40m², but can be 23m² to 83m²



The Empowershack 2.0 provides the roof and the frame of the home and then residents finish off the house themselves using a metal facade.



company (which it is hoped will be replaced by the South African government), 25% is provided by the community, and the other 25% by rental income.

Designed and developed by Empower, an interdisciplinary project directed by the Urban Think Tank from the Swiss Federal Institute of Technology (ETHZ) and Ikhayalami Development Services, in collaboration with the BT Section (Site C) community of Khayelitsha, the Empower Shack 2.0 delivers a greater level of permanence than the original Empower Shack, described by Brillembourg as “just an activation”. Designed over two or three storeys, 2.0 incorporates bricks and mortar with corrugated iron set out in a row house typology. This allows external permanent walls to be shared, freeing up space for landscaping, thoroughfares and shared social areas, while residents, using corrugated iron, can build the front walls.

“We provide the roof and the frame, then residents finish off the house themselves using a metal facade,” says Brillembourg. “They can personalise it. Not only that, there is also the politics of materials. I wanted to leave a little reference, which still holds

the memory of the shack. It’s a hybrid between a formal house and an informal house. It’s not a one-house-fits-all situation; there’s individualisation. The houses will be finished over time. It will look like the Bo-Kaap eventually, with the Klip-lok [normally used on warehouse roofing] corrugated iron walls taken down and replaced.”

Community participation was essential for buy-in and sustainability of the project, and was achieved through a system of “blocking out”, a collaborative process involving the realignment of houses to facilitate courtyards and thoroughfares. This entailed participatory planning workshops run with Ikhayalami and a self-selected team from the community that focussed on urban planning exercises to understand the scale and use of the space (through computational mapping), where thoroughfares would run, ownership of shared urban spaces and general cluster configurations.

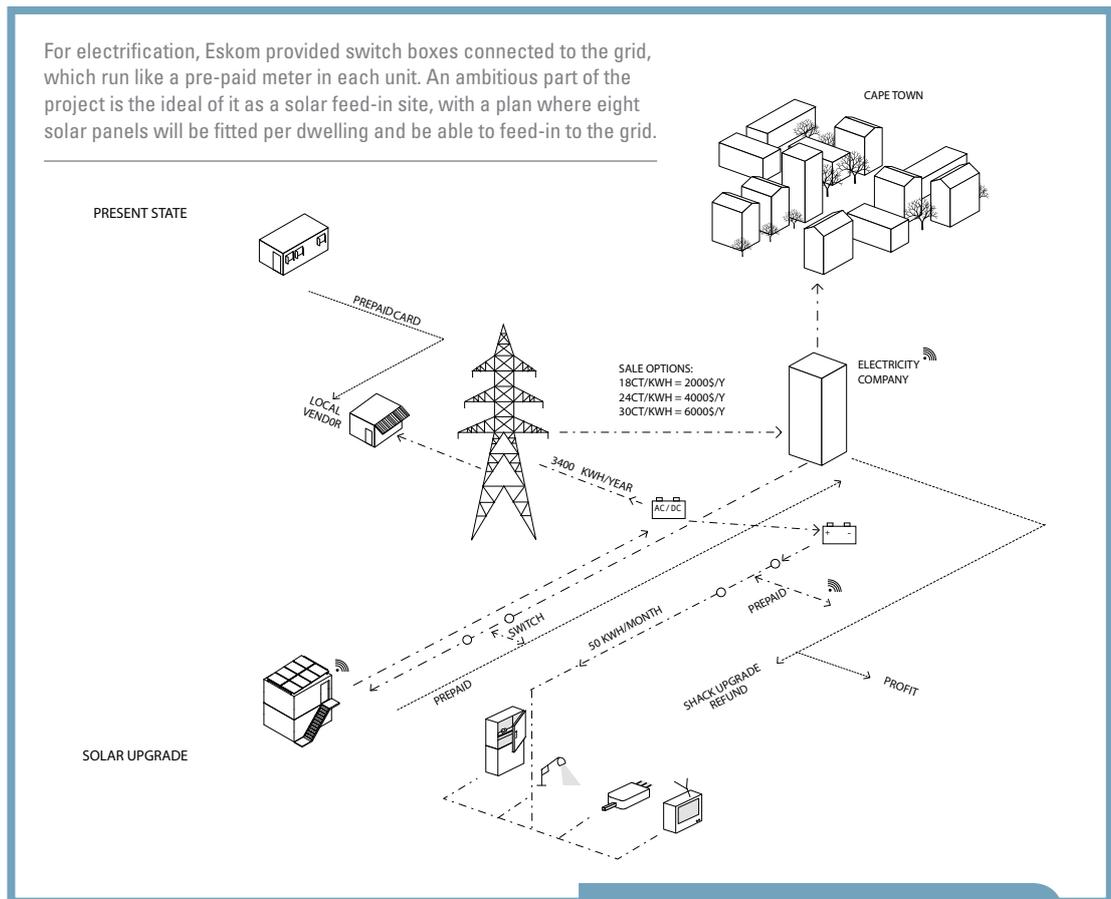
“It’s not whether you design a sustainable building, but whether these dense concentrations of people are sustainable,” says Brillembourg. “And they are not. We started to realise that architects, just





The Empowershack 2.0 offers a greater level of permanence than its predecessor and is built over two or three storeys, incorporating brick and mortar with corrugated iron.

For electrification, Eskom provided switch boxes connected to the grid, which run like a pre-paid meter in each unit. An ambitious part of the project is the ideal of it as a solar feed-in site, with a plan where eight solar panels will be fitted per dwelling and be able to feed-in to the grid.



working as designers, are far too limited. We can be incredible glue for all the different professions that make a city – engineers, social workers and so on.”

Not only is the planning process participatory, but the building is as well. Residents cut the windows and assist with the wiring of the houses. Guidance is provided, however, especially to facilitate temperature control and lighting. But the most important temperature regulator is the roof. “The roof is a pre-fab Structured Insulated Panel made from Chromadek EPS-IBR, usually associated with cool room warehouse storage units, which provides optimum summer inside temperature comfort,” says architect Scott Lloyd of the Urban Think Tank team. “Roof overhangs and vertical shading from firewalls have been calculated to shield the facade from afternoon summer sun. We use a locally manufactured heat-stop translucent profile on the facade to allow light but cut out 60% of radiant heat. Planting, site position, and wind corridors all help regulate the comfort on the urban scale.”

For electrification, Eskom provided switch boxes connected to the grid, which run like a pre-paid meter in each unit. “We are offering an approved electric plug and play system that is pre-made to fit the unit sizes and potential room layouts,” says

SUSTAINABILITY FEATURES

- 1,6kW to 2,5kW solar panels on each house and working towards rooftop solar farm
- Re-use of run-off and grey water for ecological landscape management
- Positioning of windows allows for passive temperature control and lighting
- Densification of units allows for greater services efficiency for electrical and water infrastructure but also decreases power consumption with conservation circuits and batteries
- Community engagement through “blocking out” to achieve informal settlement upgrading

Lloyd. “The system includes two low energy lights and switches on extension chords, and two multi-plug extension chords. These can be installed by residents themselves, thus avoiding expensive electrician costs.” An urban LED facade lighting system will provide visibility but “no shadows” in outside areas, improving public safety.

The Empower Shack 2.0 is protected against fire through standard concrete block firewalls with parapets, which provide a fire barrier between each unit, with the added benefits of creating greater structural integrity and sound isolation. “In addition, the metal facade panels we are using have a better fire rating than the common steel/zinc panels found in most informal dwellings,” he says. Research is underway into options for wireless smoke

detectors, including the local Lumkani project (see *earthworks* issue 25, p.26). Firebreaks, access routes for emergency services, green corridors, and water stations in the urban plan for BT-North will provide additional mitigation when it comes to fires.

A water reuse system has been implemented with grey water from the bathroom being channelled into the plant area, while black water is connected to the sewerage system. Rainwater is also captured. Each dwelling contains a 200 litre water tank, which is connected to the mains water, gaining from the free water allowance of six kilolitres of water per month. When this is used up, the tanks trickle to fill.

But perhaps the most ambitious part of the project is the ideal of it as a solar feed-in site. PJCarew Consulting, under the guidance of the German-based company Transsolar, has developed a plan whereby eight solar panels will be fitted per dwelling, with 20kW inverters serving 8 to 12 dwellings in a cluster and 8 to 10 clusters for the whole development. The idea is that the sum of the inverters will amount to a medium sized solar installation of around 200kW. Residents can use the income generated by providing electricity to the grid to upgrade their homes.

However, sustainability consultant Paul Carew says the economics are currently against this. “We need to come up with a new concept,” he says, and suggests a “wheeling agreement” whereby the Empower clusters become producers of green electricity. Another company can then purchase electricity from them at less cost than conventional electricity, with the added social responsibility value. A renewable energy provider can then finance the installation and residents can rent their roof space back to the company.”

What is crucial is that residents group together to ensure the establishment of a medium voltage connection. “At the moment, Eskom won’t let you connect to the grid to feed back if you are an individual low voltage user,” says Carew, who adds that the team is currently “reassembling the parts of the puzzle to find a way to fit it into current policy and regulation requirements”. What is important though, is that there is a “direct association between the benefit of the panels and the people below them”, ensuring community buy-in and less likelihood of theft. This is building towards Transsolar’s original concept of South African cities combining commitments to increase renewable energy production as well as improving housing conditions, to resolve a shortage of area available for solar panels.

SOURCEBOOK

Architects • Urban Think Tank (Hubert Klumpner and Alfredo Brillembourg) at the Swiss Federal Institute of Technology • www.u-tt.com • brillembourg@arch.ethz.ch.

Engineers • De Villiers and Hulme • www.dvh.co.za • 021 417-2180 and Isidima Engineering • www.isidima.net • 021 531-0429

Solar • Transsolar • www.transsolar.com • +49 711 679 760 • and PJCarew Consulting • www.pjc.co.za • 021 426 4050

Contractors Ikhayalami Development Services • www.ikhayalami.org • 021 689 9408 and CTW Construction Group • www.ctwgroup.co.za • 083 633 3011

UMNYAMA IKHAYA CONTAINER POD HOME

The Umnyama Ikhaya container pod home embraces the concept of up-cycling through repurposing of 12.19m x 2.44m x 2.9m-high used shipping containers into modular units in one or multi-bedroom configurations. The containers can also be attached side-by-side or stacked to form bigger homes and decks can be added. Container homes are produced at the factory then assembled on-site. Though well suited to the low income market, Umnyama Ikhaya CEO John Venter says they also have projects on-going in high income areas like Three Anchor Bay and Newlands, in Cape Town.

The homes can be connected to green power technology, though most of the home’s electricity needs in terms of water heating and cooking runs off gas. There is provision to connect mini wind turbines that can generate up to 1kW power. “Only areas at Cape Point are windy enough so we plan to use mini wind turbines for our 15m² storage pods,” says Venter. Sustainable SA supplies wind turbines as well as optional solar panels, which will also generate up to 1kW for residences, should the buyers choose this option.

Savings on water are also top of mind. “A waterless self-composting toilet system is used, where after four weeks the dry matter can be used as odourless compost in the garden.” An angled Chromadek roof

SUSTAINABILITY FEATURES

- Gas stove and solar fridge
- 9 x LED lights, as well as LED television and decoder
- 5000 litre water tank
- Solar ceiling fan
- Hydrofire fireplace with extractor
- Waterless toilet
- Bosch gas water heater
- Solar water pump
- Angled Chromadek roof for rainwater harvesting
- Bamboo kitchen and cupboards
- Flooring in recycled PVC
- Green growing facade fitted to front of house

facilitates rainwater harvesting and a solar pump is used for water pressure.

To facilitate temperature control, the containers are insulated with four-centimetre fire retardant Chromadek panels with polystyrene. The unit will be partially clad with Nutec. “We use a tongue and groove board so it looks like a wood grain and we paint it in a wood colour,” he says. There are fans for ventilation and windows can be opened and closed.

The biggest challenge with the project was to conform the homes to off-grid living, says Venter, which he is hoping the new partnership with GreenFin will facilitate. The homes are also treated as conventional homes in terms of certification so the process is the same: he is hoping to get certification from Agrément by June to certify it

as an alternative building technology, but factory production had already started in Paarl at the time of writing. The pods are destined for Gauteng, Mpumalanga, KwaZulu-Natal and the Western Cape, and Venter is also looking at producing for other countries in Africa. ☉

SOURCEBOOK

Project developer • Umyama Ikhaya • John Venter • john@umnyamaikhaya.co.za • 073 254 1514

Architect • Grow Architecture • Christo Wepener • www.growarchitecture.com • 082 681 4454

Engineers • Fabrinox • Retief Scheepers • www.fabrinox.com • 021 877 5000

Contractors • Various BEE contractors depending on the area where the pod is ordered in SA. They are only used for setting the foundations. Pods are produced at the factory in Paarl.

NUTSHELL

Size (of pods) • 30m²
Cost (of one pod) • R315 000 – R325 000
Construction time • 8 weeks



The Umyama Ikhaya container pod incorporates many sustainability features such as renewable energy and rainwater harvesting, to enable off grid living.



TYPICAL 1 BEDROOM UNIT