

# SUMMARY OF THE GREEN HOME RETROFIT.

## *My Green Home – as at August 2014*

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### The Retrofit Process

In May 2014 the Ngewana family home underwent a ‘retrofit’ to make it more energy and water efficient, to reduce waste going to landfill and encourage the use of non-toxic products for the home. The following are the principal elements of the retrofit, organized into the following categories: Energy, Water, as well as Waste and Toxics. In addition, the Vineyard Hotel (which has done a commendable level of greening of their own buildings and operations) kindly sponsored accommodation for the family for 2 nights of the retrofit when the house was particularly ‘uninhabitable’ (with building dust and toilets being replaced etc).

Note that before the retrofit the family spent the month of April 2014 focussing on only behaviour changes. Their no-cost habit changes first saved them about a third of their utility costs - 33% saving on electricity and 31% saving on water, which are truly significant savings. Each theme page (e.g. hot water, lighting etc) on the [My Green Home website](#) explains which no-cost actions they took.

Then with the retrofit, the savings were boosted to 48% for electricity and 45% for water, which exceeds the goals they set. For more, see the ‘Count the Savings’ page on the website too.

### ENERGY

**Solar Water Heater:** The house used to get its hot water from an electric geyser in the roof-space that was initially set to 70 degrees. Hot water was the largest component of electricity consumption in the house. On a north-facing roof above the second-floor bathroom, a solar water heater was installed. This consists of a single, 2.5 m<sup>2</sup> flat panel and a 300 litre tank, mounted horizontally, immediately above the panel.



(Note that this may be replaced with a larger tank model shortly, as this is probably undersized for this family’s use and is not performing as well as anticipated.) The water is heated indirectly, using a glycol solution that flows to the tank without an electric pump, using the thermosiphon effect. The tank has an electrical element for supplementary heat during increment weather or high volume need. The system carries a 10-year warranty. The solar water heater was sponsored and installed by SolarTech, which is a national service provider and accredited by the City of Cape Town.

**Geyser thermostat control:** The solar water heater (SWH) is controlled by a Geysewise thermostat timer. This is a South African product that operates the thermostat for the electric element on the SWH tank. It can be set with different temperatures for four separate segments of the day, allowing maximum control to try to minimize the use of the electric element while still supplying adequate hot water to the family. It was sponsored by Geysewise and installed by SolarTech.



**Heat pump:** The house has an outbuilding that includes a laundry, storeroom and a flatlet with a bedroom and bathroom. This building had a separate geyser, which was not in use at the time the project began because no one was living in the cottage. An energy efficient replacement was sought to prevent high consumption in the future when hot water is needed at the laundry and flatlet. The building is almost completely shaded during the day, so the geyser was replaced by an Alliance heat pump, sponsored by Fourways Air-conditioning and installed by SolarTech. The geyser unit was insulated to reduce heat loss with a geyser insulation kit provided by Saint-Gobain Isover.



**Solar photovoltaic panels:** After the house was made as efficient as possible, in early June a 230 watt photovoltaic system was installed with a panel on the roof next to the solar water heater. The PV panel is generating electricity to reduce the amount of purchased electricity during daylight hours, and it does not store electricity. For now, their electricity supplier is not set up to buy excess electricity from them, so the system was kept small to just cover some 'baseload' of daily use. In the future, it is possible that it could be expanded and the family could sell any electricity they do not use back into the electricity grid. The approximately 230 watts that the PV panel can generate in full summer sun covers most of what is required to run their efficient pool pump or some of the power needed to run other appliances being used e.g. washing machine, iron, kettle, televisions etc. The solar photovoltaic system was sponsored and installed by Citrine Construction.



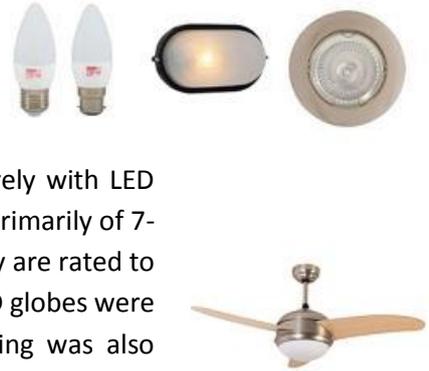
**Closed-combustion wood pellet fireplace:** The lounge had an open fireplace that was previously used on occasion with anthracite coal or wood, together with a gas heater. The open fireplace was covered over with a Calore Piazzatta closed-combustion fireplace, burning wood pellets made in South Africa from scrap wood and sawdust. The stove is fan assisted and has a small duct at floor level to send some heat in the direction of the downstairs bedrooms. The pellet fireplace was sponsored and installed by Calore, South Africa.



**Ceiling insulation:** Previously, there was no insulation in the ceiling. The entire ceiling was fitted with fibreglass batts 135 mm thick, to an R-value of 3.38 in line with the local climatic zone requirements. The insulation is manufactured in South Africa, from 80 percent recycled glass. These were sponsored and installed by Saint-Gobain Isover.



**LED lighting:** The house was previously lit by a combination of CFLs (compact fluorescent lights) in bedrooms and kitchen, as well as 50-watt dichroic halogen down-lights in most of the living rooms. Some outdoors lights were left on all night for security purposes. The house was retrofitted entirely with LED (light emitting diodes) lighting, inside and out. These consisted primarily of 7-watt GU10 LED lamps to replace the 50-watt halogen bulbs. They are rated to last 30 000 hours. In other rooms, A-shape and candle-shape LED globes were fitted in both existing and new fixtures. Additional task lighting was also provided at the kitchen counter and bedrooms. The exterior lights were converted to motion-sensor LED floodlights. All lighting was sponsored and installed by Eurolux.



**Ceiling fans:** Although many of the rooms had ceiling fans, but they were not very efficient and have been replaced with more efficient ceiling fans sponsored and installed by Eurolux.

**Pool pump:** The house had a small pool pump rated at .55 kW, but was in fact drawing just over 600 watts in, which was about a third of the total energy consumption due to faulty 24/7 operation. A new Speck Badu Eco-Touch variable speed pump was installed. At its lowest setting, which is adequate for filtering, it uses 300 watts. The pump and an LED pool light was sponsored and installed by Speck Pumps, South Africa.



**Televisions:** The house had two televisions. One was a cathode ray tube (CRT) model and one had a liquid crystal display (LCD). Both were replaced by LED backlight, 32 inch televisions using only 50 watts. The televisions were sponsored and installed by Hisense.



**Refrigerator:** The old refrigerator was replaced by a new Hisense refrigerator with an energy rating of A+ under the European Union's energy rating system. The EU estimate for annual consumption is 310 kWh per year. The refrigerator was sponsored and installed by Hisense.



**Stovetop:** The electric-element stovetop was replaced by a dual gas/induction stove. The stove has two gas plates and two induction plates, both units have two plate sizes. The induction stove would be predicted to save approximately 30 percent on electricity compared to an ordinary electric stove. The stove was supplied and installed by Snappy Chef. Since the induction stove uses magnetic forces, it requires steel (magnetic) pots and pans, which were also supplied by Snappy Chef.



**Skylight:** The staircase in the centre of the house initially received no natural light and needed electric lighting even during daylight hours. The roof and ceiling above the staircase were fitted with a solar-light tube to bring daylight down from the roof to the ceiling. The light tube was sponsored and installed by Skylite Concepts.



**Electric bicycle:** To raise awareness around alternative fuel sources and transport options the family received the use of an electric bicycle for free rental for three months. The Octave (formerly known as the Metro) made history as the first model ever to be purpose designed and built as an electric bike – rather than a bike with added electrics or motor. Taking its cue from popular scooters, the Octave’s handle bar-based throttle grip gives power on demand, with a maximum speed of 25km/h (15.5mph) and has a range of up to 65 km. The electric bicycle was provided by Cycology.



**Home energy management device:** The HomeBug home energy management device connects to the pre-paid meter of the house and monitors electricity consumption. Current and recent consumption can be read on the display itself, and patterns of usage can be seen – measured over various time scales and presented in table or graph form – on the HomeBug website or mobile App. This will allow the family to have a monitoring capability in the long term. This is a South African product and was sponsored and installed by HomeBug.



**Roof insulation paint:** The north-facing metal roof and the balcony were painted with a thermal barrier paint to reduce the summer heat load. This locally produced paint has no volatile organic compounds (VOCs) and thus does not contribute to smog or health problems. It is a powder-based paint that is mixed onsite, which further reduces water consumption and wastage. The paint and its application was sponsored by BreatheCoat.



**Heat-retention/insulation cookers:** A Wonderbag insulation cooker for the kitchen was donated by Natural Balance. The insulation cooker finishes the cooking process by retaining heat in pots when removed from the stove, eliminating the energy required for long simmering on the stove. The company estimates that if used an average of three times a week, Wonderbags can save 0.5 tonnes of carbon per year, per house. (This would be the equivalent of about 500 kWh since 1kWh = 1kg CO<sub>2</sub> in South Africa.)



**Solar cellphone charger:** A set of mobile photovoltaic panel DC cellphone chargers and a battery pack was sponsored by Green Africa Initiatives.



**Winter bedding:** Woolworths sponsored winter brushed cotton bedding, as well as duvet inners and pillows made from recycled PET. The City of Cape Town also provided fleece blankets branded with the SAVE electricity branding.



**Window insulation:** There were various gaps where the windows did not close tight and these have been sealed with a simple DIY rubber window seal from the local hardware store to prevent air leakage and maintain thermal comfort, i.e. hot air coming in (summer) and warm air going out (winter).



## **WATER**

**Dual-flush toilets:** All ordinary, single-flush toilets were replaced by dual-flush toilets that exceed South African standards for dual-flush toilets by 20 percent. The toilets use 4,8 litres for a full flush and 2,4 for a half flush, while the pan has also been designed to require less water. Toilets were sponsored and installed by Lecico, South Africa.



**Low-flow shower heads:** All shower heads in the home were replaced with low-flow shower heads rated at 9 litres per minute. The flow rate of the original showerheads in the home ranged between 12 and 20 litres of water. These were replaced with water efficient showerheads, with flow rates between 6 and 9 litres per minutes. A thermostatic mixer was installed in the newly renovated bathroom, while the family also received a shower timer. The bathroom and kitchen fixtures were sponsored and installed by HansGrohe, while Saint-Gobain Weber Tylon sponsored the tiles to enable the bathroom renovation.



**Basin and sink mixers and taps:** Kitchen and bathroom taps were replaced by aerated mixers and taps to reduce water consumption. These were sponsored and installed by HansGrohe.



**Greywater system:** A Garden Rhapsody system was installed to distribute laundry and bathroom greywater to the garden. The water flows into a 250 litres tank, which is automatically pumped out when the tank fills up. The water is distributed by means of ordinary hosepipe and sprinkler, which can be manually moved to spread the water to different parts of the garden. The family and housekeeper have agreed to use phosphate-free laundry cleaning products that are suited for use in a garden greywater system. The greywater system was sponsored and installed by Water Rhapsody.



**Poolside tank:** The pool's filtration system has been connected to a tank which stores backwash water for 24-hours, after which it can be returned to the pool rather than being released to the sewerage system and replaced by municipal water. Sediment and debris is given time to settle with the assistance of a flocculent, then the clear water from the top of the tank is returned to the pool. The backwash tank was sponsored and installed by Water Rhapsody.



**Water monitoring system:** The municipal water line to the house was fitted with an AquaTrip water monitor. This is a permanently installed leak detection system with an inbuilt control valve to automatically shut off the water supply if a leak or a burst pipe is detected. It also provides real time water consumption and cost information via an information display and control panel. It was sponsored and installed by AquaTrip.



**Waterwise and food gardening:** Gardening consultants Cape Contours Landscape Solutions have prepared a Landscape Design and Planting Plan for the property in order to convert the existing garden into a waterwise indigenous garden combined with an organic food garden.



## WASTE AND TOXINS

**No-VOC paint:** The house was painted with Breathecoat EcoGuard exterior paint, which contains no volatile organic compounds (VOCs) and thus does not contribute to any of the indoor-air health problems associated with VOCs. It also does not contribute to smog formation outdoors. The paint also has no formaldehyde. The bathroom ceilings and selected interior walls were all painted with mould guard. The paint and its application was sponsored by BreatheCoat, Eco Afrika Lifestyle Paints.



**Recycling bins:** The kitchen now has a small, foot-pedal recycling bin with colour-coded compartments for separation of recyclables, sponsored by PostWink. A countertop organic waste bin has also been provided to the family, along with larger recycling bins for their weekly needs as a big family with an active social life.



**Worm farm:** A small worm farm has been set up at the home for the vermicomposting of kitchen fruit and vegetable scraps. The worm farm will supply both liquid 'worm tea' fertilizer and compost for the garden, while reducing the quantity of organic waste going to the landfill, supplementing the existing compost heap. The worm farm was sponsored and stocked with worms by Wizzard Worms.



**Cleaning products:** The cupboards of the house have been stocked with biodegradable and non-toxic cleaning products, sponsored by Better Earth and EcoSmart.



**Organic foods:** A small selection of organic-based food product was provided by Tierhoek to the family to encourage them to consider how they can include more local and organic food into their daily lifestyle, which is produced without harmful chemicals.

