

Cape Town, South Africa

Cape Town renovates for energy efficient homes and healthy residents

Cape Town’s climate can be moist and cold, making its residents susceptible to tuberculosis and other illnesses, especially in low-income neighborhoods where housing often lacks the proper insulation. The City of Cape Town realized that by focusing on retrofitting ceilings in low-income communities, they can achieve multiple benefits: improving the health of the communities and the energy efficiency of the buildings.

A Cape Town family receives a new insulated ceiling.



What are the key lessons learned?

Between the years of 1994 and 2005, Cape Town under the jurisdiction of national subsidized housing rules, built homes for its low-income communities without insulated ceilings. These homes are known locally as Reconstruction and Development Programme (RDP) homes. No insulated ceiling means that these homes do not maintain internal temperature well (they become very cold and humid in the winter and get extremely hot in the summer) making it difficult to sustain a healthy indoor environment. In Cape Town, nearly 32% of the population lives in poverty making RDP housing prominent and essential for its residents.

Not only is a lack of insulation detrimental to energy use and costs, it is a concern for the health of occupants. Communities in Cape Town are susceptible to tuberculosis, colds, and other illnesses due to the moisture levels and cold temperatures. These health risks are especially high in low-income neighborhoods where housing often lacks the proper insulation or plastering, leading to poor indoor thermal conditions and detrimental air quality. From 2001, the Western Cape Department of Health has been reporting that the number of tuberculosis cases is extremely high. Since then, they have been dedicated to reducing the number of cases significantly. Housing retrofits to improve insulation is a key aspect of this effort. To address health, energy, and climate simultaneously, pilot projects were initiated in 2010 to install insulated ceilings and proper exterior plastering in RDP homes. During initial phases of the project, the Energy and Climate Change Unit (ECC), within the Environmental Resource Management Department (now the

Sustainable Energy Markets' Low Income Energy Services Branch), allocated resources to communities ensuring that funding would be sufficient to retrofit all homes within one community.

The pilot projects were a glowing success in these areas according to survey results from the communities. Results showed significant improvements in health, happiness, and economic mobility. The upgrades also resulted in significant reductions in energy and health care costs for the residents. The success of the pilot projects led to additional funding for the project from South Africa’s Green Fund that consists of national and international funding for projects that reduce GHG emissions and mitigate climate change. With additional funding, the City planned for and implemented a larger multi-community roll-out of the project. This phase consisted of 8,001 ceilings in communities on the outskirts of Cape Town.

Ultimately, Cape Town’s ceiling retrofit project was able to deliver energy efficient homes with reduced financial burdens on their residents. The addition of insulated ceilings dramatically changed the health and wellness of the inhabitants, reducing healthcare costs and increasing livability and opportunity. These results align with the City of Cape Town’s Strategic Focus Areas (SFAs) introduced in the five year Integrated Development Plan (IDP), especially the strategic focus areas of a Caring City (SFA 3) and an Opportunity City (SFA 1). This project delivered multiple benefits to Cape Town’s low-income communities and helped to meet the City’s goals for more integrated development.



Installing insulated ceilings in low-income homes in Cape Town can reduce the fuel used to heat homes by up to 74% in the winter. The ceiling retrofit project in Cape Town has included to date, the retrofit of 10,540 homes. It is estimated that the total impact of these retrofits so far will save approximately 7,400 tons of CO2 each year. With the full expansion of the program to 40,000 RDP homes, the City could see emission reductions of up to 28,000 tons of CO2 per year.



This project targets the low-income communities placed on the outskirts of Cape Town with many financial burdens including transportation, food costs, and energy costs. The ceiling retrofit program was created to improve the lives of these communities by reducing energy and healthcare costs through better thermal envelopes for their homes, providing more stable indoor temperatures and improved air quality.

Case Study Type: Project	Primary Sector: Energy and Buildings
ICA Pillar: Impact	Primary Impact: Health

How might these lessons be used in your City?

Address multiple challenges simultaneously to make the case for funding

Before the Cape Town ceiling retrofit project, city departments were aware of climate-related health issues. For instance, due to the city's Mediterranean climate and winter rains, many residents in Cape Town are susceptible to sickness due to the absence of proper insulation and plastered exteriors for their homes.

The City has had a painful history with tuberculosis due to these climate-related challenges. Both City Health and the Western Cape Department of Health have been vocal about working to reduce the number of cases and improve the health and wellness of its citizens. The awareness of the local climate's impact on Cape Town's people, especially when not protected from the cold and damp conditions, set the stage for the ceiling retrofit project.

The city of Cape Town has been a leader in climate adaptation and mitigation, implementing initiatives and joining global efforts to address the impacts of climate change. As it came to making the case for funding for the ceiling retrofit project, climate played a large role. Addressing the climate impact becomes even more important if taking into account the future demand for energy as the economic status in these communities improves. For these communities, energy costs make up a significant proportion of a household budget, especially in the winter months, and health care costs can cause unexpected financial stress. With ceiling retrofits and reduced energy and healthcare costs, these households experience improved indoor air quality and have the ability to afford additional appliances or equipment for more comfortable indoor temperatures. More efficient homes will make a significant difference now and also in the future when these households have more financial resources that will lead to higher energy consumption.

Ensure new buildings are built to standard before retrofitting old ones

The ECC (now the Sustainable Energy Markets [SEM] Low Income Energy Services Branch) secured funding for the ceiling retrofit project and brought the project to fruition. On the ground, the ECC was familiar with the negative impacts the RDP homes were having on communities and recognised that this was a serious problem that needed greater attention. The team brought awareness to national levels of South Africa that the housing subsidies did not cover the installation of insulated ceilings or exterior plastering that was necessary to keep energy costs down and health and wellness improving. In their experience, it is much more costly to retrofit the existing homes



than it is to design and build homes with these components in the first place. In 2015, the RDP subsidy regulations were updated nationwide. Now, all new low-income housing will be built with properly insulated ceilings and plastering while existing buildings will be able to secure funding for ceiling retrofits.

Pilot a project to better understand the needs

To jump-start the ceiling retrofit project, two main pilot projects were completed. One pilot was led in Mamre by the ECC while a second was led out of Kuyasa by the NGO SouthSouthNorth (SSN) with oversight by the ECC. The Mamre pilot covered 240 ceiling retrofits and was conducted in 2010. It was a R1.9 million investment funded by the Danish International Development Assistance (DANIDA) Urban Fund and included the support of the wages for 20 temporary workers from the Mamre community to help implement the pilot project. These jobs were facilitated through the national Expanded Public Works Programme (EPWP), coordinated by the national Department of Public Works (DPW), where a selection of projects must provide temporary employment for unemployed citizens. In this program, municipalities submit requests for funding through DPW and if successful, must report regularly on progress and employ locals based on available funding and criteria such as gender, race, age group, and skill level.

The Kuyasa pilot program, located in the Khayelitsha area, covered 2,300 homes and was conducted between August 2008 and October 2010. This pilot integrated ceiling retrofits and plastered exteriors with solar water heater installations in addition to improved electrical wiring for energy efficient lighting. This pilot program was funded through the Department of Environment and Tourism's Social Responsibility Programme and the Provincial Government's Department of Housing^[2] and led by the NGO SouthSouthNorth.

As a part of this pilot, nearly 2,350 people were provided with temporary jobs ranging from clerical roles to semi-skilled, skilled, and supervisor positions^[2].

Ultimately, surveys showed that participants in this pilot program preferred building retrofits such as the insulated ceilings and plastered exteriors to the solar water heaters. The solar water heaters require proper installation and operation or else they are at risk of failure, which was the case for some program participants who received faulty equipment. With leaking and malfunctioning water heaters, the homeowners were at risk of having their ceilings cave in from the water damage and weight of the water heaters. The City of Cape Town learned from this pilot that investment should focus on ceiling retrofit efforts.

Retrofits for meaningful community impacts



Safer and healthier living conditions



7,400 tons of emissions avoided



Reduced healthcare and energy costs

Ceiling retrofits, plastered exteriors, solar water heaters, energy efficient lighting



Roll-out project
Across more communities



Pilot a project
Gain knowledge and expertise



Ensure new building standards
Before retrofitting old ones



Local hiring:
Providing community members with training and work experience



Community surveys:
Measuring impact for additional funding



Smart living:
Educating community members on maintenance and sustainability

Kuyasa Community

The Kuyasa community is nestled in a township settlement called Khayelitsha located southeast of Cape Town. As a township of predominately informal housing, the exact population of Kuyasa and other similar townships is difficult to estimate. It is however approximated that 32% of the population in Kuyasa live in shacks while others live in housing made of cement block or brick. Demographically, the majority of Kuyasa's population is made up of black Africans where the head of the house averages 40 years old. Kuyasa is located 30 km outside of Cape Town's city center and is devoid of public transportation making it difficult to travel to and access jobs and other amenities. There is a heavy dependence on minibus taxis for travel due to the ageing and unreliable rail network. The Khayelitsha area is vulnerable to heavy rain storms, high winds and fires, and wet and cold conditions. Furthermore, the population in Kuyasa is faced with high rates of tuberculosis, HIV/AIDS, asthma, and influenza^[3]. In addition to being a low-income community with predominately unemployed communities, this area has many other economic, social and environmental challenges and obstacles to overcome. Many of these challenges are alleviated through holistic programs like the ceiling retrofit project.

Secure a project champion for growth and success

Following the pilot projects and a lengthy search for additional funding, the team was able to secure funding from South Africa's Green Fund^[4], which collects capital from national and international organizations for funding projects with climate mitigation potential. Once the project had secured external funding, the City of Cape Town would typically provide 10% of the project cost. However, in this case, the city provided more funding than required, understanding the importance of the project.

The ECC as well as City Health and Sustainable Energy Africa (a not-for-profit which has worked extensively in low income energy service) led the effort to get the ceiling retrofit project off the ground, championing its success. The group brought together the necessary stakeholders, identified the target communities for the project, based on the funding available at that time, and organized the implementation of the project. Not long after the project's pilot phase was completed, Mayor Patricia de Lille took notice of the pilot projects, celebrating the success and congratulating the team on a well done job. Going forward, she took a front seat in helping to progress the project for the large roll-out to 8,001 homes.

Teach communities how to maintain systems and live smart

The additional funding through the Green Fund allowed the project to install another 8,001 ceilings in new communities including Gordons Bay, Macassar, Wesbank, Sir Lowry's Pass Village, and Chris Nissan Village. In this phase of the project, a portion of the funding was allocated for education and training. This effort was two-fold, both educating the community on how to install and maintain new ceilings, and also educating recipients on how to live more healthy and sustainable lives.

The workforce training and development was organized and led in conjunction with National Urban Reconstruction and Housing Agency where there was a focus on selecting a diverse group, including women and younger individuals. Data from the workforce program show that of the 89 trainees, 51 were women and the majority were younger individuals, who would build up work experience through the program.

As part of receiving a newly insulated ceiling and plastered walls, community members were given "Smart Living Training" which shared best practices for cooking, ventilating, heating homes, and other related activities. The training was supported by the Smart Living Handbook which guides Cape Town residents in resource-efficient, sustainable daily practices around water, waste, energy, and biodiversity^[5]. The intention was to raise awareness of the impacts the retrofits would provide and the opportunities these communities could take advantage of.

Additionally, during the pilot phases, recipients were given "Wonder Bags" and during the large roll-out they were raffled out to a handful of winners. The Wonder Bags act as insulating covers for pots and other cooking vessels to keep in heat and act as a slow cooker for up to eight hours without fuel use^[6]. These products allow individuals to significantly reduce the amount of paraffin and other harmful cooking fuels needed on a daily basis helping to improve the indoor air quality of homes and the health of residents. The ceiling retrofit program was built on the understanding that to fully realize the benefits of the retrofits, the residents of these low-income communities needed to be exposed to the impacts and opportunities and informed of how to properly maintain their new equipment.

Smart Living Handbook

The Smart Living Handbook^[7] is supported by the Environmental Resource Management Department and was initially created by AMATHEMBA Environmental Management Consulting and Sustainable Energy Africa. The handbook is used in many projects in Cape Town as a resource for educating communities on how to live sustainable lives covering topics including waste, energy, water, and biodiversity. The handbook not only instructs households on how to act more sustainably with practical steps for implementation but also educates communities on the challenges associated with these resources and what the City is doing to manage them. The Smart Living Handbook is a valuable resource for ensuring that communities understand the benefits of climate action and their own personal responsibilities for addressing climate change.

Project milestones



Evaluate the impacts

Each of the pilot projects and the larger project roll-out involved a survey process to better understand the projects' impacts. As part of the Mamre pilot project, the City of Cape Town and the International Council for Local Environmental Initiatives (ICLEI) Africa engaged nearly 140 of the 240 households in surveys^[8]. For the Kuyasa pilot, with help from the UK Government's Foresight Project, Migration and Global Environment Change group, more than 1,800 households were engaged in surveys. Finally, as part of the most recent roll-out initiated in 2014, the City of Cape Town and Thrie Energy Collective engaged 1,100 households^[9]. These surveys collected information from community members on topics such as heating and fuel expenses, incidents of sickness, number of days missed at work due to sickness, and more.

The findings in each case were significant – clearly illustrating a positive impact in each of these communities. The residents of these low-income communities were healthier, happier, and more economically active due to improved health and a smaller energy cost burden. The level of joy felt by the community was unexpected and immense.

Grow programs for larger impact

In Cape Town, there are still approximately 40,000 RDP homes in need of ceiling retrofits and other energy efficiency improvements. The Sustainable Energy Markets (SEM) Low Income Energy Services Branch (previously the ECC) continues to look for funding opportunities and creative ways to progress this project and its impactful work. The nature of such a project is that the retrofits are not cheap and require significant investment and labor which the City believes will come in due time. As the SEM Low Income Energy Services Branch looks to secure additional funding, monitoring and surveying will continue to be done in these communities for a more extensive understanding of the long-term impacts of the projects. Through previous efforts, it is clear that these seemingly simple retrofits make an enormous difference to the RDP housing communities like Mamre, Kuyasa, and so many more in Cape Town.

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