

The Urban-LEDs program aims to enhance the transition to low emission urban development in emerging economy countries. This showcase project focuses on a community centre that had no access to grid electricity. Through the installation of renewable energy options the centre now functions more effectively and the whole community benefits.

Summary

In order to move from strategic planning to demonstrating low emission solutions in a tangible, practical manner on ground level, a suitable local community project was sought. After initial consultation the Doornkop Community was selected, as they had already expressed their vision of implementing renewable energy solutions amidst the coalmines of Mpumalanga.

A variety of different renewable energy solutions were implemented at the local community centre with the aim of showcasing practical solutions. This included an 18kWp solar PV array, solar water heaters, solar street lights, ceilings for insulation and some small scale energy saving items. The importance of community participation and awareness was recognised, which led to the hosting of a renewable energy expo and workshops emphasizing on-the-job training.

This community showcase project was implemented as part of the Urban-LEDs project to enhance the transition to low emission urban development in Brazil, Indonesia, India and South Africa. Steve Tshwete Local Municipality is one of two model cities selected to participate in the Urban-LEDs program in South Africa. The ICLEI team worked closely with the municipality to do a GHG inventory and low carbon strategy through a scenario planning process.

Introduction: A dual-pronged approach, combining a practical showcase with strategic planning

The Doornkop showcase of low carbon development solutions demonstrated the benefits of combining strategic planning at municipal level with the practical implementation of a community showcase project. While it is critical to develop a long-term strategy for low emission development, such a strategy can be very abstract and difficult to relate to. The implementation of a tangible project makes it real and allows people to see the benefits.

While funding or development support is often made available for strategic planning, it is the tangible implementation of projects on the ground that makes this a reality. Ensuring a dual-pronged approach will assist both the local community and the municipality in gaining a better understanding around what is needed to implement change and the benefits. This is specifically important in developing countries and secondary cities that often do not have sufficient staff capacity. To ensure the long-term sustainability of the project it is important to ensure that there is a practical application that is integrated into the local community.



Facts & Figures

Population / Land area
229,831 (2011) (growth: 4,8% pa)
/ 3,987 km² (2015)

Municipal budget
ZAR 1,399 million (2014/15)

Greenhouse gas inventory
Yes (since 2012)

Total GHG emissions for area
5.2 million tCO₂e (2012)

Doornkop Community Structure:

The Doornkop Communal Property Association (CPA) is a legal entity established under the Communal Property Association Act (Act no 28 of 1996) with the mandate to hold, control, manage and administer land on behalf of its beneficiaries. The CPA owns a portion of the Doornkop Farm in Mpumalanga, 15 kilometres north of Middelburg in the Steve Tshwete Local Municipal area. The community has a population of around 9000 people with around 577 households and around 8000 illegal squatters.

The Doornkop CPA has an Executive Committee of five members who are guided by the CPA Act and its regulations, as well as the Doornkop Constitution, to execute their full mandate. The CPA provides various services to the local community, including administration of community services, development planning and facilitation and community mobilization. In addition to this there is an old age day care centre, crèche, community hall, digital doorway, feeding scheme for scholars and community training.

Local context

Steve Tshwete Local Municipality is situated in the heartland of the Mpumalanga coalmines approximately 140km directly east of the administrative capital of South Africa (Pretoria) in the Nkangala District, in the province of Mpumalanga. The town was first established in 1864 and is still known as Middelburg. In 2011, a new dispensation of Local Government came into being and the name of the municipality changed to Steve Tshwete.

A number of National and Provincial roads traverse the area of jurisdiction of the Municipality. There was a significant growth increase in early 2000 with a number of new industries opening in the area. The economy is driven by mining, trade and manufacturing.

The municipality has made huge investments in infrastructure and housing development and as a result of that, poverty and inequality has been decreasing steadily. The unemployment rate has dropped from 35.4 percent in 2001 to 19.7 percent in 2011.

Due to the rapid increase in the population additional strain is being placed on municipal services. Finding low emission solutions could help relieve municipal resources whilst ensuring continued economic and social development with lower environmental impact.

Community Showcase Initiative at Doornkop

A dual-pronged approach

In an attempt to demonstrate the concrete implementation of low emission principles at the heart of the strategic planning activities in a practical way, it was decided to install solar solutions at a rural community centre within the municipality. Through local political support the Doornkop Community was identified as a suitable area for implementing a demonstration project because they already had a vision of being more sustainable.

Background: Although the Doornkop community centre initially had grid electricity provided by Eskom, the cables were stolen frequently and difficult to replace, and the bill reached as high as R80 000 per month. In light of these experiences, the community decided that they wanted to explore the option of going off-grid. This left them in a unique position where the buildings had electrical fittings and appliances that could not be utilized. Additionally, an innovative dry sanitation system which uses small solar PV panels, was already in use, so many people were already familiar with the use of solar energy. In addition to the focus on the community centre, the local youth co-op (Greenlite) had also identified the need for provision of renewable energy products to the local community, which led to hosting a renewable energy expo.

Renewable Energy Rural Expo:

In an attempt to promote renewable energy in the community the first "Renewable Energy Rural Expo" was hosted at Doornkop in April 2015. The expo was arranged with the aim of achieving the following objectives:

- Increasing awareness and education to the local community on renewable energy technologies;
- Catalyzing market research on what is needed within the local community;
- Providing opportunity to connect with suppliers of renewable energy technologies;

- Discussing different financing options such as local financing focusing on renewable energy products.

The Expo was a huge success with various activities over the two days and a keen interest from the community. Various service providers showcased their products and different workshops were held. A summary of the expo is available at <https://doornkop.wordpress.com/expo/>

Low Emission Solutions implemented at the Doornkop Community Centre:

An eco-audit was done at the community centre to determine their needs and select suitable renewable energy solutions. This included reviewing the lights and appliances that were not in use due to the lack of electricity, as well as determining the future needs of the main community centre, the adjoining crèche, and old age day care centre.

The biggest priority was the installation of **solar PV and battery bank** to allow for an off-grid electricity solution. While the initial system commissioned by ICLEI was only 5kW, additional funding was provided by a local business and the system was upgraded to a 18kW system. The final system includes 68x 260w solar panels, 32 batteries and six inverters.

Two solar water heaters (150 litres) were installed on the roof of the community centre and care taker's home for use by the community and caretaker, which also provides warm water for the crèche and old age centre.

Although the main building already had lights (mostly 35w fluorescent lights), additional security lights were installed around the community centre and surrounding buildings. LED tube lights were also installed in the crèche and old age home, which never before had any electricity.

Five solar streetlights were installed to provide lighting to the surrounding area and enhance security. Different types of lights were installed to provide an opportunity for practical testing of different lights, allowing users to see a variety of costing options and different technologies.

Ceilings were installed in the crèche and old age day care centre in Doornkop to assist with the insulation of these buildings, as it gets very hot during summer and cold in winter.

Smaller items were also provided to the centre as part of the Urban-LEDs initiative, including mobile LED solar lights, insulation cookers and compost containers.



Mayor Masina attended the Renewable Energy Expo where a variety of different solar and energy efficient solutions were on display (Grace Stead, 2015).



Learners test the solar cooker on display at the Renewable Energy Expo to showcase the power of solar (Grace Stead, 2015).

Dinokeng Early Childhood Development Centre:

"We are really happy to have electricity because now the children can watch television and listen to music. We can also meet with parents after hours because we now have lights."

Kopanang and Ikageng Home Base and Drop-in Centres:

"The fridges have made a big difference to us because we can keep food fresher for longer, so we don't need to travel to town so frequently and we can keep the diabetic insulin cold."

These cost effective solutions were provided to encourage local uptake within the community. Educational posters were developed for installation at the Community Centre to provide information about the different elements that were implemented through this project.



Before: Crèche prior to the installation of the ceiling, which was very cold in the winter and hot in the summer. They also had no access to electricity (Grace Stead, 2015).



After: Crèche after the installation of the lights and ceiling, which helps with insulation and indoor comfort (Grace Stead, 2015).

Results

The impact on the local community has been significant and has improved the lives of the residents in the area. Various community organisations use the centre, and they now function more effectively. The safety in the area has also improved due to the additional lights.

Training and awareness raising within the local community throughout the implementation of the various measures has assisted with taking them along on the journey towards a more sustainable future. Members from the local youth co-op

received skills training and assisted with the installation of the ceilings, solar PV and solar water heaters. Schneider Electrical provided additional training to 50 community members on access to energy, while ten of these members also participated in a Schneider Entrepreneurs programme. This has contributed to developing employable skills and opened up new opportunities within the local community.

The showcase project has resulted in tangible carbon emission reductions, which show that similar projects can be replicated over time in other areas. The table below provides an overview of calculated savings for carbon emissions.

Table 1: Calculated annual carbon emission savings at Doornkop

Item	Description	CO ₂ eq savings/ year
Solar PV panels	68 x 260W photovoltaic panels with battery bank	17.026 tonne
Solar water heater	2 x 200 litres, without a backup element	3.749 tonne
Interior lights	9 x T5 double LED lights (10w each = 180w) in place of T5 double fluorescent lights (35w each = 630w)	0.636 tonne
Exterior lights	200w LED spotlights for outdoors in place of 1200w in Incandescent exterior lights	4.687 tonne
Solar streetlights	5 x solar powered street lights	6.570 tonne
Ceilings	Ceilings were installed in the crèche and old age day care centre	0.265 tonne
Wonderbag	While the Wonderbag has an estimated CO ₂ saving of half a ton per annum per household. Five catering size units and two standard units were provided to the community.	3.500 tonne
Mobile solar light	The mobile solar light will mainly be used as a demonstration model and thus the direct saving is not much, but the indirect saving of education and awareness can be significant.	0.275 tonne
TOTAL CO₂ eq savings per annum	36.7 tonne	36.7 tonne

Provision of alternative energy solutions reduce the need for and use of the sole national electricity supplier, Eskom, which is currently under strain to provide electricity to the entire nation.

Lessons Learned

The community showcase initiative has generated a wealth of insight in implementing demonstration projects as catalysts for wider change:

- **A community process can ensure locally grounded priorities:** The demonstration projects were directly embedded in buildings used by local communities. Through significant engagement with local leadership and councillors, the community priorities were identified and put first.
- **Long-term maintenance needs need to be identified:** The community process also helped establish the requirements for the long-term operations and maintenance of any installed infrastructure that the community or municipality would have to take responsibility for. As part of shared responsibility, the community representatives signed an agreement for the long-term maintenance of the infrastructure provided.
- **Selecting technology for the long-term:** Long-term maintenance was also addressed by providing low-upkeep equipment and technology, which requires minimum technical maintenance.
- **Financial security requires community ownership:** The Doornkop community was encouraged to increase their own income generation by asking energy users to contribute financially when using electricity generated by the solar panels. While

Community centre:

"We can now have meetings in the evenings because there is light in the building. We also have Wi-Fi so can do our work here in Doornkop, instead of travelling into town and now that we have electricity we can do presentations. The solar street light also helps to keep our people safe, because many of us need to take a taxi into town before sunrise, or only get home after dark."

Local community development workers:

"Previously we had no place to charge our phones, but now we can charge our phones and do our work. It is also great that we can have a cup of coffee at the office when it is cold in the morning."



Solar water heater and solar PV array on the roof of the Doornkop Community Centre to provide electricity for the community centre, crèche and old age day care centre (Grace Stead, 2015)



Installation of solar PV panels on the Doornkop Community centre with support from the local community co-op (Morwesi Ramonyai, 2015).

sunlight is free, the maintenance and security is not. It is essential that the local community takes full responsibility for this and that they understand the value of their contribution, as well as the importance of allocating funds for future project expenses.

- **Capacity building is essential:**

It was essential that the community had a basic understanding of the technology that was installed and what their responsibility was in the process. The implementation was done in line with the requirements of each specific project, ranging from a renewable energy expo, through to on-the-job training. All service providers were encouraged to work closely with the local community.

- **'Local is lekker' – supporting the local economy:** Although it might have been easier to appoint one service provider to implement all the different projects, it was decided to appoint a local service provider in each of the different municipalities. This directly supported the local economy and created a better relationship between the service provider and community residents.
- **A multi-pronged approach can embed the project within the overarching municipal strategy:** This community showcase was one part of the overall Urban-LEDS project. In Steve Tshwete and KwaDukuza, three-years of intensive work included the calculation of the municipal greenhouse gas footprint, development of stakeholder-led low emission development strategies and action plans, as well as training and capacity building of staff and local communities. The combination of these different interventions is a powerful and comprehensive model that can be replicated elsewhere.
- Finally, the most valuable lesson learnt was that **implementation of a showcase project in a municipality sparks political and community-level interest and enthusiasm which should be handled with care and sensitivity.** It also helps people gain a practical understanding of what change is possible.

To ensure that these community showcase projects lead to long-term success, three areas of focus remain:

- Ensuring that the mechanisms recommended to ensure long-term sustainability are actually put in place;
- exploring financial solutions that can be found to up-scale these projects, replicating them in these municipalities and in other locations; and
- working to mainstream lower carbon infrastructure and decision-making criteria into municipal planning strategies, policies and plans.

Replication

'Inkqayiingenangentlontlo (Xhosa) - All accomplishments have humble beginnings.'

The combination of these different interventions is a powerful and comprehensive model that can be replicated elsewhere. It assisted in providing a tangible example of a low emission solution in the heart of coalmine country, while encouraging municipal

staff to gain a better understanding of different practical solutions and the potential for replication. An important element here was getting the buy-in and support from the local community. Only then will we see the kinds of systemic change that our human settlements desperately need if they are to become resource efficient and sustainable places to live, work and play in.

A municipality looking to repeat the success of Steve Tshwete should consider the following elements as necessary for replication:

- **Access to finance:** A project of this nature is currently still quite expensive, specifically in relation to the cost of grid electricity. It does, however, provide a renewable energy solution in a coalmining area, where the “cost” of health and the natural environment also needs to be taken into consideration.
- **Community engagement and support:** This project would not be a success without the buy-in and support of the local community. Due to high potential of theft it is critical that the community takes ownership and ensures that the assets are protected so that the whole community can benefit.
- **Community characteristics:** Firstly they needed to have a communal centre where they all work from that can jointly access the benefit of the solar panels, and secondly they need to have a functional structure to ensure the ongoing maintenance of the system.
- **Time:** While the time for actual implementation is not not take very long, the engagement time is critical to ensure that the community have a solid understanding of the whole system and their responsibility in ensuring long-term sustainability. Time needs to be allocated to engaging with the community and ensure that they have sufficient capacity to continue in the future.
- **Capacity Building:** This was an important aspect in the project and is recommended if the project is to be replicated. Building capacity within the local community encourages engagement and helps to build trust. The community is also more likely to take ownership if they have an understanding of the technology.
- **Suitable Technology:** Selecting suitable technology was important as this can help to reduce the maintenance costs. Different types of solar streetlights were installed to allow for the testing of different technologies. The choice of technology is also a function of funds available; however the renewable energy product market is constantly expanding whilst simultaneously becoming more economical. As each project will vary even slightly, some time should be invested initially in researching the most cost-effective and appropriate technology per project.

The Urban-LEDS Project

An Urban Low Emissions Development Strategy (Urban LEDS) defines a pathway to transition a city to a low emission, green and inclusive urban economy, through its integration into existing city development plans and processes.

The Urban-LEDS project (March 2012 - March 2016), funded by the European Union, was jointly implemented by UN-Habitat and ICLEI. It supported local governments in emerging economy countries (Brazil, India, Indonesia, South Africa) and in Europe to transition to urban low emission development using ICLEI's GreenClimateCities methodology, comprehensive process guidance, to integrate low emission strategies into all sectors of urban planning and development.

For more information, please visit: <http://urbanleds.iclei.org/>

Replicability of project



Rating:

- | | |
|---|---|
| 1: not significant to the initiative | 4: very significant to the initiative |
| 2: somewhat significant to the initiative | 5: an incredibly significant factor for the replicability/success of the initiative |
| 3: significant to the initiative | |

Replicability Box

Metric	Rating (from 1-5)
Access to finance	3
Community support	4
Community Characteristics	4
Time	3
Capacity building	4
Suitable technology	3

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Costs and Funding

The bulk of the funding of the showcase implementation project in Doornkop was provided through the Urban-LEDS project, while the local municipality provided support in kind and a local business contributed to expanding the solar PV system. While the initial funding focused on the actual products, it became clear that funding also had to be allocated towards security and that long-term maintenance had to be taken into consideration.

Description	Rand value	Euro value*
Value of infrastructure and support provided via ICLEI Africa	R 540,402	€ 32,166
Value of infrastructure and support provided via ICLEI Africa	R 684 000	€ 40,712
Total value of showcase project (incl VAT)	R 1,224,402	€ 72,881
Total value of showcase project (incl VAT)	R 1,224,402	€ 72,881

*Conversion is based on current exchange rate of R16.8 per Euro

References and Further Reading

Steve Tshwete Local Municipality, 2015, 2012-2017 Integrated Development Plan 2016/17 IDP Review Draft, STLM, STLM

Doornkop - Showcasing Solar Solutions, official Renewable Energy Expo website: <https://doornkop.wordpress.com/expo/>

Urban Energy Support, information portal supporting South African local government to meet sustainable energy and climate change challenges: <http://www.cityenergy.org.za/>



Steve Tshwete Local Municipality (STLM)



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They represent solely the views of the authors and cannot in any circumstances be regarded as the official position of the European Union.

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