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# SAGEN: Renewable Energy

## Institutionalising PV training in the City of Tshwane’s staff development programme

GIZ SAGEN supports the City’s efforts to develop skills relating to the technical and economic basics of PV systems, as well as creating an understanding of the impacts that SSEG systems might have on the City of Tshwane’s distribution system.

### The challenge

Faced by electricity shortages and increasing tariffs, and at the same time decreasing costs of Renewable Energy Small-Scale Embedded Generators (SSEG) as well as very good solar and wind resources in most parts of the country, more and more electricity customers turn to meeting a part of their demand themselves. In particular, roof-top photovoltaic (PV) systems become increasingly attractive for electricity self-generation in the residential sector, and particularly in the commercial and industrial sector. However, this is creating financial and technical challenges for municipalities, as many of them act as distribution grid operators. Municipalities are therefore looking to develop the technical and organisational capacities to work with customers wanting to install SSEG systems on their premises.

The South African German Energy Programme (SAGEN) is supporting the South African Local Government Association (SALGA), the Association of Municipal Electricity Utilities (AMEU) and individual municipalities in their efforts to create a regulatory environment that allows for the safe and economically feasible integration of SSEG into distribution systems.

The City of Tshwane (CoT) is one of the frontrunner municipalities offering a programme that allows customers

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ENERGY PROGRAMME



### At a glance...

Objective	To increase capacities to facilitate grid interconnection applications of SSEG operators within the electricity division of the City of Tshwane
Implementation partners	City of Tshwane electricity division
Cooperation partners	Department of Energy, SA Local Government Association (SALGA)
Impact	<p>A sustainable approach to the skills and knowledge transfer of the City of Tshwane staff is established. This contributes to:</p> <ul style="list-style-type: none"> <li>Safe and reliable small-scale PV systems in the City of Tshwane are connected to the grid legally.</li> <li>The City of Tshwane manages the increased number of SSEG customers in an orderly and structured manner.</li> <li>Reduction of the City’s carbon footprint due to the decreased demand for electricity from coal power plants.</li> </ul>





to interconnect PV systems to the City's distribution grid. Yet the City's capacity to technically understand, assess and inspect PV systems was limited. Hence, CoT officials identified the need for structured and continuous capacity development for their staff. SAGEN supported the electricity division's internal training centre with developing and implementing a train-the-trainer course on PV systems and funded PV facilities for practical training.

## Approach

### Training and capacity building

The City of Tshwane operates an internal training facility and employs its own trainers. The centre mainly focuses on the development of the staff in technical fields relevant to the daily work of the employees. This created an excellent basis for the introduction of new training courses on PV. On behalf of SAGEN, Maxx Solar Academy conducted a needs assessment with the internal trainers and other relevant stakeholders in the CoT's electricity division. Based on the identified requirements, a two-day training course was developed.

The course covers the basics of solar energy, PV technology and economics for a wider audience, but also detailed technical issues around the planning, installation and especially the commissioning and typical failures for inspectors and other technical staff.

From the very beginning, the internal trainers were involved in the development of the curriculum and training material. This way, the training-of-trainers sessions were very successful, resulting in a well-accepted first training course presented by the City's trainers to some of their colleagues.

The feedback during the first sessions indicated a potential for further improvement with regard to the duration of the



course as well as some specific topics that were identified. With the experience gained during the train-the-trainer sessions and being actively involved in the development of the original course, the CoT's trainers are well prepared to adapt and improve the curriculum in an ever-changing and developing environment. This allows for relevant, high-quality training for all existing and new staff involved in PV installations.

### Procurement of PV demonstration systems

To practically acquaint the CoT's staff with PV systems and enable practical training on the real subject, SAGEN funded three small-scale PV systems in accordance with the city's requirements and specifications. The systems demonstrate different technologies, including various cell technologies (crystalline silicon and thin film) and mounting methods (roof and ground mount).

Additionally, one system is equipped with batteries and is able to function as a hybrid system that will also supply some appliances in times when the grid is down. This type of application is of particular interest for the members of the electrical inspectorate (responsible for commissioning of PV systems), as a connection like this to the public grid could pose a potential hazard to the utility's staff if not installed properly. Usually, PV systems must be switched off during times when the grid is not available in order to avoid electrifying the grid and hence potentially threatening staff working on lines they believe are dead. PV systems able to operate in an uninterruptable power supply or back-up mode circumvent this so-called anti-islanding function to keep the lights on behind the meter. Consequently, these systems must provide additional safety features preventing them from electrifying dead grids. With the systems SAGEN provided to CoT, staff members can learn the differences and see best-practice installations.

Furthermore, as with the curricula development, the CoT's trainers were involved in the installation to gain hands-on experience. This enhances their capability to convey not only theoretical, but practical knowledge to the trainees.

## Results in figures ...

To this point, a total of 24 staff members of the City of Tshwane's electricity division have participated in the PV training courses. Furthermore, the City now owns and operates three PV systems with a combined capacity of 9 kWp. In addition to the practical training application, the PV systems will produce approximately 15,500 kWh of electricity per year.

## ... and in stories

In addition to conveying technical knowledge, part of the train-the-trainers course also focused on didactics and honing the soft skills of the trainers. While the trainers agreed that in-depth knowledge of the technicalities around PV systems is most important for the specific trainings, they especially appreciated the didactic exercise, as it allowed them to discover new, creative ways to approach training and, in the end, increase their confidence in their own abilities.

Moreover, the participation of CoT staff in the installation of the PV systems and practical training on the systems led to some intense discussions on potential critical incidents and best practice. While sometimes time-consuming, these discussions were productive, as they led to a much deeper understanding of specific issues that would not be possible in a classroom situation, as participants tried to convince



the others of their point. Hence, they had to be sure they understood the issue and also questioned their own positions.

The positive outcome and implementation of the initiative also gained support from the municipal leadership and SALGA. The official launch of the training programme and the ribbon-cutting ceremony for the PV systems were honoured by the presence of City of Tshwane MMC Councillor Darryl Moss as well as Nlhanlha Ngidi, head of electricity and energy in the municipal infrastructure and services division at SALGA.

In conclusion, the support offered by the SAGEN Programme will assist the City of Tshwane's electricity division to cope better with the challenges of the large-scale dissemination of distributed PV systems owned and operated by the City's customers.





## What next ...

The City of Tshwane will continue to offer PV training for its staff to be prepared for the challenges that lie ahead. This will include further development of the course material to address a frequently changing environment. SAGEN will continue to support CoT where needed. In addition, CoT is considering opening its facilities and training sessions to staff of other municipalities and stakeholders to use the full potential of the facilities.

SAGEN will continue to support municipalities in their efforts to meet the challenges posed by the emerging energy transition. Such support includes capacity building as well as technical support based on the needs of our South African partners.

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