Paint the energy efficiency numbers

Paint that cools down buildings and saves electricity sounds either too good to be true or like science fiction. It is, in fact, neither. The science has been proven, as has practical application and now a large-scale rollout is transforming military bases in one of the hottest provinces of South Africa.

The largest single cool-surface project ever in sub-Saharan Africa is currently being rolled out on military bases in South Africa's Limpopo province. Not only is it making personnel's working environments more thermally comfortable, but the data that is being gathered will be used to advise policy in the country.

The scale of this project is impressive: the first phase involves 470 800m^2 and the second 900 000m^2; together, an area equal to approximately 1.37 million m^2 will be covered in cool-surface paint by the end of 2025 when the five-year project is scheduled to be completed. By the end of 2023, 366 000m^2 of building envelope, i.e., walls and roofs, had already been painted, turning personnel housing, schools, creches, clinics and mega military structures into far more comfortable working and living spaces and cutting down dramatically on air-conditioning use. In fact, says Dr Karen Surridge who leads this collaborative project on behalf of the South African National Energy Development Institute (SANEDI), some residents are saying that their offices are now a bit chilly in winter - fortunately a short season in Limpopo.

While paint is considered to be a low-tech solution, the application of the cool-surface variety does involve more than a paintbrush and scaffolding. The old paint has to be stripped completely and the surface primed properly before the painting starts. And, much like sunscreen that also protects, the cool-surface paint has to be applied to a certain thickness. "The paint contains a compound similar to what is found in sunblock and works in much the same way in that it pushes heat and light away from the building," explains Surridge. Given how important application is, the project rollout includes training and upskilling artisans in the military to be able to implement this project should it be nationally expanded.

To date, the project has delivered over 50 new jobs. Job activities and/or skills include roofing inspection, site preparation, use of scaffolding, minor repairs to roofs and spray guns, as well as health and safety procedures and quality assurance. The next phase of this SANEDI cool-surface project in the region, is expected to double the number of new jobs and upskilling opportunities. The contracted project leader on site is a young woman with only matric to her name, but an innate ability to lead a project. "She is a born project leader," says Surridge of Hilda Muthivhi.

The project being implemented on the military bases is part of an initiative that has been mandated by the Department of Mineral Resources and Energy in support of the larger, historic One Million Cool Roofs Challenge.. This passive energy efficiency technology is just one of the ways that Government is driving towards an energy secure future.

As a scientist, Surridge is particularly interested in the data that is being gathered as the project rolls out. She explains that the scale of the initiative enables SANEDI to study the so-called cool-bubble" effect for the first time in South Africa. International research has already proven that in high-density

built-up areas, a bubble of cooler temperature forms over and between buildings as the paint pushes away heat. “The large bases we are painting are like towns themselves, making them ideal to measure the cool-bubble effect under local conditions,” says Surridge. The aim is to dispel any doubts around the potential of cool-surface paint to benefit South African cities and to use the data to advise government policy in this regard. The team is building a case for it to be easy to mandate fact-based standard operating procedures in the hopes that at least government buildings will be coated in cool-surface paint.

“The project with our military partners is not even halfway yet and already we are seeing great results,” says Surridge. “The data shows a marked difference between coated and uncoated buildings, and the energy savings are considerable. As always, our Department of Defence partners are fully committed to proving technology effectiveness for the citizens of South Africa.”

Cool-surface paint is known as a passive building/structural energy efficiency measure. In cooler buildings air-conditioning units don’t have to work as hard, which saves electricity and maintenance costs over the lifespan of a unit. While about 30% more expensive than ordinary paint, the cool-surface coating has a minimum lifespan of 10 years, which cuts down on routine maintenance expenses. As an added benefit, the paint waterproofs the surface area it encapsulates to a large extent (if applied properly) and acts as a fire retardant, giving people up to two extra hours to vacate a burning building. “A great benefit for the military is that encapsulating older buildings with cool-surface paint, mitigates some cost and health implications of the asbestos that many still have,” says Surridge.

Cool-surface paint is available in a spectrum of colours. While white delivers the best cooling effect, all light colours will deliver a good result. Even black cool-surface paint has an impact.

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