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UNIVERSITY OF PRETORIA OPTS FOR RECORD BREAKING SOLAR WATER HEATING SYSTEM

Holms and Friends has recently completed a solar water heating (SWH) project for the University of Pretoria (UP) –currently the biggest glazed installation in Southern Africa. **Holms and Friends** was established in 2003, originating from a merger of specific expertise from three other companies, in the related industry for over ten years at that time. The company specialises in integrated energy strategies and EPC for large-scale, commercial solar water heating and photovoltaic systems. They also provide training in the renewable energy and energy efficiency sector as well as education for sustainable development.

Onderstepoort, or OP as it is commonly known, is situated in Pretoria North and houses South Africa´s only Veterinary Faculty. As part of an extension to the Onderstepoort campus, the University of Pretoria sought to incorporate solar warm water for their new energy efficient residences, housing 550 students. Onderstepoort is part of the Northern Middleveldt, a climatic region in South Africa characterised by its distinct rainy and dry seasons. Temperatures show a large daily variation and strong solar radiation is prevalent. Accordingly, **SESSA member Holms and Friends** made use of the SUNDA PG2.0-F/G flat plate collectors, as due to Onderstepoort´s immense solar radiation, utilising costlier vacuum-tube collectors would not have been a viable option.
The 336 collectors for this system were installed on top of the campus carport. The collectors are each 2 m_2 of size, amassing to a whopping 672 square metres of collector surface. On the roof, 3 collectors are always connected in parallel. Two parallel strings are then connected in series, resulting in a thermal length of 12 m. One central feeder tube transports the warm water to a building especially constructed for the SWH-system, situated right next to the carport. This houses the heart of the system: Two giant 20 000 litre water storage tanks, an expansion tank, membrane expansion vessels (totalling 5400 litres) and 7 external heat exchangers amongst other.
The water heated by the solar panels is stored in the buffer tanks. Through external heat exchangers (i.e. they are not in the tank itself), a different continuous fresh-water supply is warmed and distributed to the individual residences. This results in an indirect loop system, having the advantage that the water in the large storage tanks, heated by the panels, automatically complies with health standards without major maintenance, since it will never be used for human consumption. It is merely the working fluid. The water is distributed through pump-circulation, via 40 mm diameter, heavily insulated pipes. These are mounted on steel frame structures, reaching each residence on campus.
A safety measure is also in place for the period when the system is not in use – for instance over the December holidays. During that time, the whole system could get extremely hot and the water can expand – sometimes even reaching a gaseous state. Merely using open expansion vessels would result in continually having to top up the working fluid. That can lead to corrosion and contamination of the system, resulting thus in choosing membrane expansion vessels for this project instead. These and all other components are “Made in Germany” quality, directly imported or locally produced by **SESSA member Holms and Friends.**

Normal grid-connected electric heating serves as a back-up for this system, but after six months of operation this has not been necessary yet. The installed system capacity of 430kW_{th}, would produce404 700 kWh electricity per year. By using solar water heating, 450 tons CO_2 were avoided and 600 980 litres

of water saved. “The savings are remarkable, the system is fully functional and a pleasure to watch”, says Alec Blackhall, manager residence affairs and accommodation, UP.

Solar array on the carports

Solar collectors on the building roofs