KOHLER | SDMO

APPLICATION: INDEPENDANT POWER PRODUCERS

CUSTOMER: SENER

POWER PLANT: 1 x 2100 kVA and 1 x 2200 kVA

LOCATION: UPINGTON – SOUTH AFRICA

KOHLER-SDMO OFFERS BACK-UP ENERGY SUPPORT TO THE SOLAR THERMAL SECTOR

The global economy and our modern lifestyles are currently largely sustained by non-renewable fossil energies. At the same time, the pace of growth among a number of emerging economies requires different energy sources to be found to enable such countries to enjoy the same quality of life as those in the developed world.

The solar thermal energy market offers a solution to this problem. Inexhaustible and available everywhere, it produces neither waste nor greenhouse gases. This is why the number of solar thermal energy parks around the world has continued to rise in recent years, even achieving an annual growth rate of some 20% between 1999 and 2006. By the end of 2010, total installed solar thermal capacity worldwide had reached 195.8 gigawatts. This growth is set to accelerate further with estimated capacity of between 600 and 800 gigawatts by 2040.

This market also includes the industrialisation of so-called "thermodynamic solar" installations, which have for a long time been marginalised in the experimentation phase. What are they, exactly? Unlike solar plants with photovoltaic panels which are better known among the general public, thermodynamic solar plants are equipped with mirrors.

In the shape of a parabola, these mirrors concentrate all the sun's rays on a single point of the parabola called the focal point, where tubes are installed. Molten salt circulates in these tubes which, thanks to the sunlight delivered by the mirror, heats up to a temperature of some 400°C.

The liquid is then transferred to an exchanger to transform it into steam to operate turbines which drive alternators, thereby producing electricity. As the site is connected to high voltage lines, the solar plant is able to export the electricity and power neighbouring towns.

Two KOHLER-SDMO generating sets for the Upington solar plant

The ILANGA I thermodynamic solar plant in Upington, South Africa, is a project conceived by the EPC consortium formed by the Spanish companies COBRA, SENER and EMVELO for the South African joint venture DANKOCOM. Construction began in October 2015 and is scheduled to produce its first electricity in November 2018. The field of solar mirrors will stretch out over an area of 869,800 m², the equivalent of 120 football stadiums. 1,064 mirror modules will be installed to produce 100 megawatts able to power a town with 80,000 households.

The location for a project of this scale is not selected at random. South Africa has an exceptionally high number of sunshine hours with clear skies virtually all year round. The solar potential of Upington is estimated at 2,400 kWh/m², well above the average of 2,000 kWh/m² required for optimum output. For comparison purposes, the solar potential of France is estimated at just 1,200 kWh/m²/year.

All the plant's modules are controlled by a computer that knows the position of the sun in real time and adjusts the position of the mirrors accordingly. The EPC consortium was looking for two generating sets able to provide backup power for the mirror motorisation system and the pumps that circulate the molten salt to the exchangers. In the event of an outage the heat transfer fluid ceases to circulate. So the generating sets must be able to pick up the baton and turn the mirrors upside down to prevent them from overheating and causing a fire.

3D view of one of the two generating sets installed on site

Significant experience with projects dedicated to thermodynamic solar plants

With its convincing technical and financial offer, KOHLER-SDMO won the tender issued by DANKOCOM for the supply of two generating sets of 2,100 kVA and 2,200 kVA. This success is also the fruit of a close relationship with the Spanish engineering company SENER, a partner of KOHLER-SDMO for this contract. The relationship has been built on numerous joint projects carried out in Spain at the solar plants of Termosol (2008), Manchasol (2009), Valle (2010) and Extresol (2011).

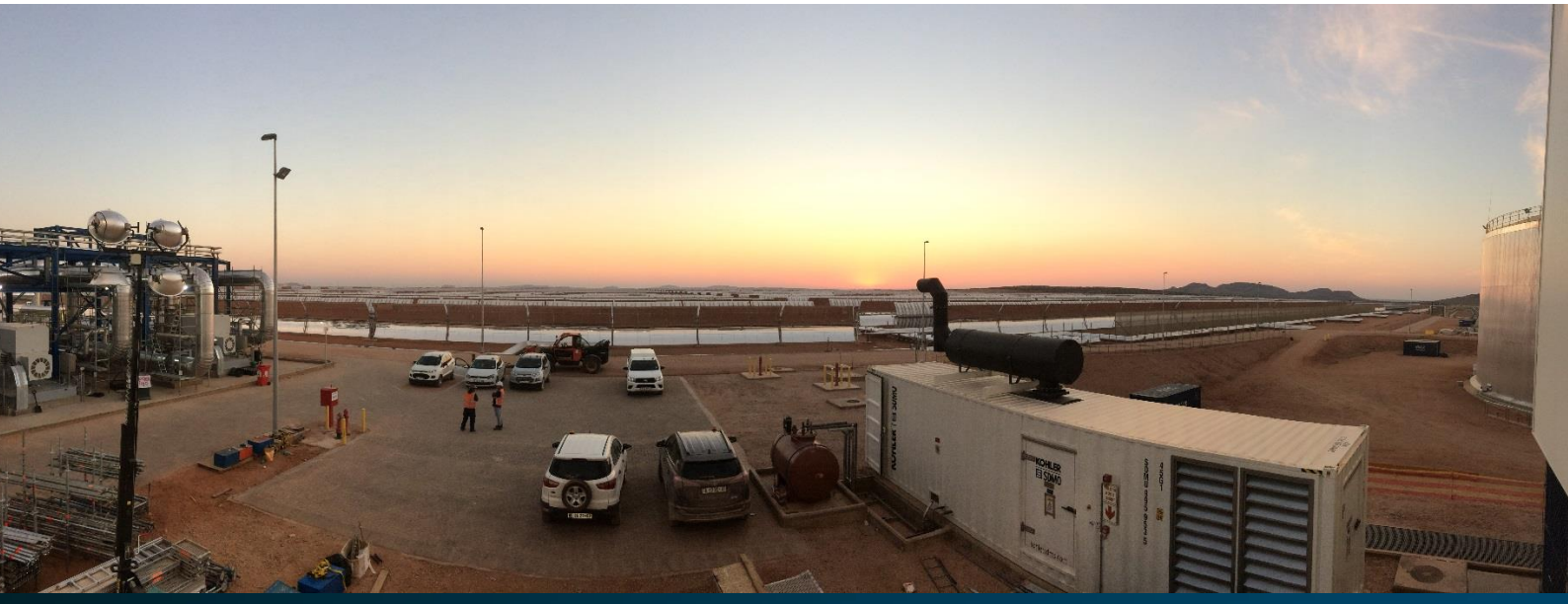
The significant experience of our personnel in projects focussing specifically on thermodynamic solar plants was of critical importance in the complex automated systems between the APM802 control unit of each generating set and the customer's monitoring system. The installation is coupled to two grid inputs to which DANKOCOM has connected all the elements it wishes to operate at the plant (pumps, mirror automation, etc.). Accordingly, in the event of a grid outage, the communication between the two interfaces enables the customer's monitoring system in turn to communicate the information to the APM802 in order to automatically start up the generating sets.

The success of the project was also supported by the professionalism of KOHLER-SDMO, which was able to effectively involve SENER from design right up to commissioning. From electrical diagrams to calculation notes, factory acceptance testing and the issue of equipment calibration certificates, our personnel were able to provide transparent, precise and methodical information to SENER's engineering teams.

The necessary flexibility dor adapting to any project

Each of the two generating sets is incorporated within a 40-foot ISO container. The KOHLER-SDMO Design & Engineering Departments designed the layout of the space to enable it to receive the volume of the generating set alongside all the functionalities required by the customer, notably the 2,000 litre fuel tank and the APM802 control cabinet. A project was also carried out to adapt the specifications to South African standards regarding digital and analogue signals and wire colours, which are different to European standards.

As each of the two gensets back up a different section of the plant, they are not coupled together and are installed at different locations on the site. An installation plan was therefore established for each genset and a KOHLER-SDMO technician dispatched to the site to complete commissioning.



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