



## Solar powered water treatment plant uses Fairford energy optimising soft starters as part of demand side management



Sixteen Fairford QFE soft starters have been installed on the drive mechanisms of aeration paddles, as part of a \$4.7 million solar power project to reduce escalating energy costs at a wastewater treatment plant operated by SC-OR (Sewer Commission Oroville Region) in Sacramento California. The Fairford soft starters are part of the Demand Side Management system at the plant, aimed at reducing total plant load and increasing the overall efficiency of the photovoltaic solar system.

The solar powered system is an highly effective response to offset a 41% rise in electricity rates that SC-OR suffered at the wastewater treatment plant (rated capacity 6.5 Million gallons per day) in 2001, an increase that would otherwise have had to be passed on to the company's ratepayers.

“SC-OR is a pay-as-you go agency, we do not receive any tax or other funding,” says Bill Lampkin, SC-OR’s Environmental Compliance Manager. “We serve about 16,500 homes and businesses in an economically depressed area, so passing on increased costs to our customers was not an option. Instead, we decided to reduce our costs through the use of solar power. We commissioned contractor, Sun Power and Geothermal Energy to install a 520 Kilowatt photovoltaic (PV) power system at the cost of \$4.7 million. This has reduced our energy costs by about 50%.”

“As a means of increasing the efficiency of the PV system, Sun Power wanted to reduce our total plant load using “Demand Side Management.” One part of this initiative involved fitting eighteen,

18.5kW Fairford QFE, energy optimising soft starters to our paddle type surface aerators. The aerators are our most critical operating unit, running 24 hrs/day, 7 days a week, yet since start-up, in March 2003, the Fairford soft starters have been trouble-free.”

“SC-OR is the latest in a number of water treatment companies who are enjoying the twin benefits of improved mechanical reliability and energy optimisation as a result of fitting our QFE soft starters to aeration paddles,” says Mark Shepherd, Managing Director of Fairford in the UK. “The energy optimizing function built-into the QFE comes into its own once a motor has been soft started and reached full speed. At this point, the motor is at the full supply voltage and driving at the torque demanded by the load. The QFE then automatically operates in the Fairford patented form of optimising control.

However under user control either via the Keypad, Bus system or through external circuitry the optimising function can be turned off. While the motor is accelerating, the controller derives and stores a reference value for the motor power factor and this is continuously compared with the running power factor. From this comparison, the software continuously computes and adjusts the firing points of the power thyristors to vary the motor flux level so that the best power factor is maintained.”

“By reducing the over-fluxing of the motor, and hence the iron losses, the motor runs cooler and more efficiently, the power factor is maintained at the most appropriate value for every condition of load, which, in turn, reduces the reactive kVA. This will bring about a significant reduction in the kVA demand which may reduce the input kW as well.”