Due to its fertile grounds, the region of Alentejo is often called Portugal’s granary. However, the summer drought is particularly pronounced here. That is why in the 1990s the Portuguese government decided to build the Alqueva dam, and for this purpose founded the EDIA (Empresa de Desenvolvimento e Infra Estruturas do Alqueva).

**Largest dam project in Europe**

Today, the Alqueva has a shore length of 1,200 km and holds over four billion cubic meters of water, making it the largest artificial lake in Europe. When completed, 110,000 ha of land are to be irrigated from it. This will enable a more intense cultivation of crops and vegetables and should also improve the yield of the olive groves.

Siemens has already been an important partner of EDIA for irrigation projects in recent years. The last large project was the Brinches Laje pump station near Serpa, designed to provide a flow of 3 m³/s, from which 12,000 ha of land are being irrigated alone. The most important requirement for the drive system here was to constantly adjust the flow rate to the water requirement, which varied depending on the temperature, the moisture content of the soil, and the state of growth of the plants, without wasting energy in the process.

**Great energy savings potential for the pumps**

Especially when it comes to fluid flow machines such as pumps, wasting energy is a problem since their power consumption increases exponentially with the number of revolutions. That is why there is a particularly large loss of energy with conventional mechanical controlling concepts in partial-load operation. Here, the motor does not always run at maximum speed, while the excess water is being throttled off with mechanical valves.

However, a variable-speed system with a frequency converter adjusts the speed exactly to the currently required flow rate and thus absorbs only as much energy as is needed at the moment. Due to the “square” characteristic curve of the power consumption, the energy savings in partial-load operation are disproportionate. The EDIA therefore decided to use variable-speed drive systems for the Brinches Laje pump station. Because of the positive experience in recent years, the EDIA selected 10 low-voltage motors of the N-compact line, the speed of which is regulated via Sinamics G150 frequency converters.

**Highly efficient drive system**

In addition to their reliability and their compact design, the N-compact low-voltage motors are characterized by their high level of efficiency. They contribute considerably to the low energy requirement of the pump station and the correspondingly low operating costs. When it comes to variable-speed operation, the Sinamics G150 frequency converters have an even greater impact on the energy balance. They reduce the energy requirement by a double-digit percentage.

Added to this are further advantages of variable-speed operation. For example, with a frequency converter, the flow...
rate can be set much more precisely and with shorter response times than with throttles or valves. In case of fluctuations in demand, the pump can also adapt the output to the current demand much more quickly and exactly. Not least, the soft starting and stopping relieves the mechanics of the drivetrain, thus increasing its service life. Pressure waves that cause stress or even damage do not occur in the pipe systems here.

The frequency converters of the Sinamics G150 line are cabinet units for low-voltage individual drives of large output that require no regeneration of energy back into the mains. They are available for delivery from 75 kW to 2,700 kW, and are reliable, quiet, compact, and easy to operate – with low costs from planning to service. EDIA has experienced this already with other pump stations, which made the choice of Sinamics drives for the 10 pumps of Brinches Laje even easier.

**Integrated overall concept**

The perfectly matched drive systems made of N-compact low-voltage motors and Sinamics G150 frequency converters are part of an integrated overall concept in which all components and systems interact perfectly.

In addition to the drive technology, Siemens also delivered Simatic S7 PLCs, local and remote monitoring systems, instrumentation, and the low-voltage switching technology for Brinches Laje, and connected all system components via industrial communication systems. In this process, the entire drive and automation environment was customized for the requirements of EDIA and its irrigation projects.

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The Brinches Laje pump station is designed for a flow of 3 m³/s and waters 12,000 ha of land with energy-efficient drive systems.