

# DRIVE SYSTEMS FOR SOLAR ENERGY PLANTS

CASE STUDY: TORRESOL ENERGY



Gemasolar solar thermal plant,  
owned by Torresol Energy ©SENER

**Solar thermal plant  
Gemasolar in Spain.**



Gemasolar solar thermal plant,  
owned by Torresol Energy ©SENER

**Continuous alignment for  
maximum light exposure.**


**Sturdy and robust in  
all weather conditions.**



**5,300 drives ensure  
high-precision sun tracking.**



**NORDBLOC.1  
helical inline geared motors.**



*The Gemasolar solar thermal plant in Spain relies on 5,300 resilient NORD drive systems to serve a host of heliostats tracking the sun: turning and tilting these mirrors ensures that they reflect a maximum of sunlight onto a tower in the center of the plant.*

Gemasolar solar thermal plant, owned by Torresol Energy ©SENER



**RENEWABLE ENERGIES**  
Heliostat mirrors



**GEARED MOTORS**  
NORDBLOC.1  
geared motors

## PROJECT CHALLENGE

The Gemasolar power plant in southern Spain is one of the first of its kind: spread over an area of 185 hectares (20,000 square ft), a vast array of mirror units focuses sunrays onto an absorber area at the top of a tower in their midst. A special liquid passes through this section of the tower and absorbs the focused thermal energy, also known as “Concentrated Solar Power” (CSP). The hot medium then flows through a heat exchanger where it is cooled down again, with the resulting water vapor driving a steam turbine that feeds a generator. The system also allows for diverting some of the flow to a tank, storing it for energy generation after sunset.

**Let there be light.** – The mirrors are designed to turn and tilt in order to ensure that as much sunlight as possible is reflected onto the designated area on the tower – from dawn till dusk, as long as the

sun remains in a mirror’s line of sight. Each heliostat must obviously be adjusted again and again over the course of the day, since a maximum of light and thermal power can only be captured by ideally positioned mirrors.

**Unwieldy giants.** – Given the size, weight, and shape of these mirror units, each of them depends on a powerful, sturdy, and robust drive solution to ensure reliable tracking of the sun. In addition, all equipment used here must also tolerate exposure to extremely high environmental temperatures. Moreover, each heliostat has a flat surface of about 120 m<sup>2</sup> (1,300 square ft), which makes them markedly susceptible to strong winds and gales that inevitably occur in this region from time to time.

## FOCUS ON THE CUSTOMER

Torresol Energy Investments, S.A., was founded in 2008 as a joint venture between Spanish engineering giant SENER and Masdar, Abu Dhabi’s state-owned future energy enterprise. Torresol Energy focuses on the construction, operation, and maintenance of CSP plants (“Concentrated Solar Power”) as well as on further developing this solar thermal technology. The company has plants in operation or projects underway in the Mediterranean region, the Middle East, and the United States.





## APPLICATION SOLUTION

The heliostats at the Gemasolar plant are equipped with size 5 heavy-duty geared motors from NORD DRIVESYSTEMS' NORDBLOC.1 series. Two such geared motors serve every mirror unit in order to allow for movements along two axes and enable it to accurately track the path of the sun. The NORDBLOC.1 gear design not only does without extra holes for assembly, but also provides a number of other exceptional characteristics and benefits in particularly demanding applications, including e.g.

- particularly large bearing dimensions,
- a staggered bearing topology,
- a higher tolerance for transverse forces,
- a higher tolerance for axial forces and
- a very long lifespan for the bearings.

**Resistant, light, flexible.** – The gears' aluminum housings need no paint finish as they provide robust, natural corrosion

protection out of the box. Based on FEM-optimized designs, these models are considerably lighter than earlier generation gears, yet also sturdier at the same time. They have proven to perform reliably under adverse conditions such as high environmental temperatures. In the case of even more demanding requirements, e.g. for operation in areas with explosion hazards, ATEX versions of all types can be supplied on request as well. Users may either opt for cost-efficient direct motor mounting or may resort to very short, space-saving and light-weight IEC adapters. Ventilation is ensured in all mounting positions.



**Sun-kissed.** – Robust geared motors for two axes ensure the heliostats keep facing the sun.

## FOCUS ON THE PROJECT

With an overall rated power of 19 MW, Gemasolar's net electrical production is 110 GWh per year – enough to supply about 30,000 households, and to cut CO<sub>2</sub> emissions by about 40,000 tons per year. NORD DRIVESYSTEMS has fitted each of the 2,650 heliostats with a pair of drives, i.e. a total of 5,300 NORDBLOC.1 geared motors. Designed for reliable operation in rugged conditions, they allow for continual, precise adjustments of every mirror to track the path of the sun.



NORDBLOC.1 gear



Conventional construction

## MORE NORD APPLICATIONS YOU MAY FIND INTERESTING:

[www.nord.com/references](http://www.nord.com/references)

Cemasolar solar thermal plant, owned by Torresol Energy ©SENER

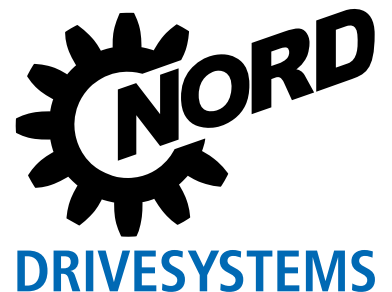


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**Member of the NORD DRIVESYSTEMS Group**

The logo features a stylized gear with the word "NORD" in a bold, sans-serif font inside it. Below the gear, the word "DRIVESYSTEMS" is written in a blue, sans-serif font.

**NORD**  
**DRIVESYSTEMS**