NOORo I

Power,
Oil & Gas

- Concentrated solar power plant with SENERtrough® parabolic trough collector technology.
- NOOR I is part of NOORo (Ouarzazate, Morocco), the largest complex of concentrating solar power (CSP) in the world.
- NOORo I counts with a molten salt thermal storage which enables the production of electricity for 3 hours in the absence of solar radiation.

In CSP, SENER is world leader not only in in the number of projects it has under its belt, the majority turnkey projects, but also for the development of proprietary technology applied to these plants, where it is also able to carry out their operation and maintenance.

240 km
SENERtrough® parabolic trough collector system

3 h
Thermal storage capacity
(equivalent hours of turbine operation)

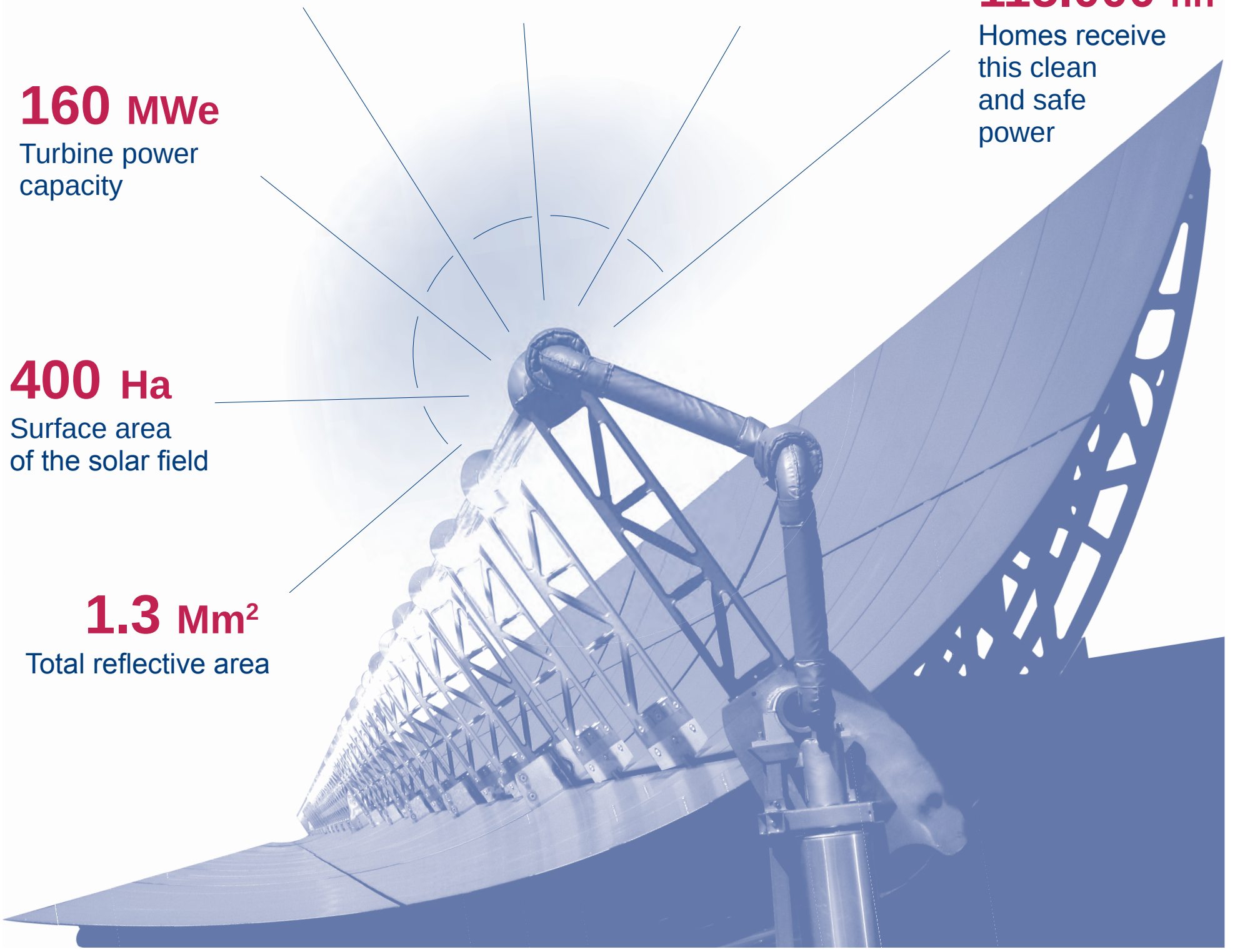
120.000 t/year
CO_2 emission savings

115.000 hh
Homes receive this clean and safe power

160 MWe
Turbine power capacity

400 Ha
Surface area of the solar field

1.3 Mm²
Total reflective area



SENER
The way to see the future

masen
endless power for progress

www.poweroilandgas.sener

NOORo I
How it works

Power,
Oil & Gas

1 SENERtrough® collectors

Solar radiation beams on the SENERtrough® collectors which concentrate said radiation in the central tube through which fluid heated to very high temperatures circulates.

This fluid, generically called HTF (Heat Transfer Fluid), is in this case similar to oil in composition.

2 Steam generator system

The HTF is pumped through the solar field where it is heated before passing to the steam generator, where it transfers its heat to vaporize water.

3 Steam turbine

The steam produced under high pressure is used to move the turbine. The turbine is connected to an alternator that generates electric power.

4 Condenser

The steam released from the turbine condenses into water that is again incorporated into the cycle.

5 Cooling tower

The cooling tower provides the cooling needed to condense the steam turbine exhaust.

6 Heat exchanger

During the day part of the thermal energy of the solar field, it is stored. This is done by diverting some of the heated HTF to the exchanger, where it transfers its heat to the salts.

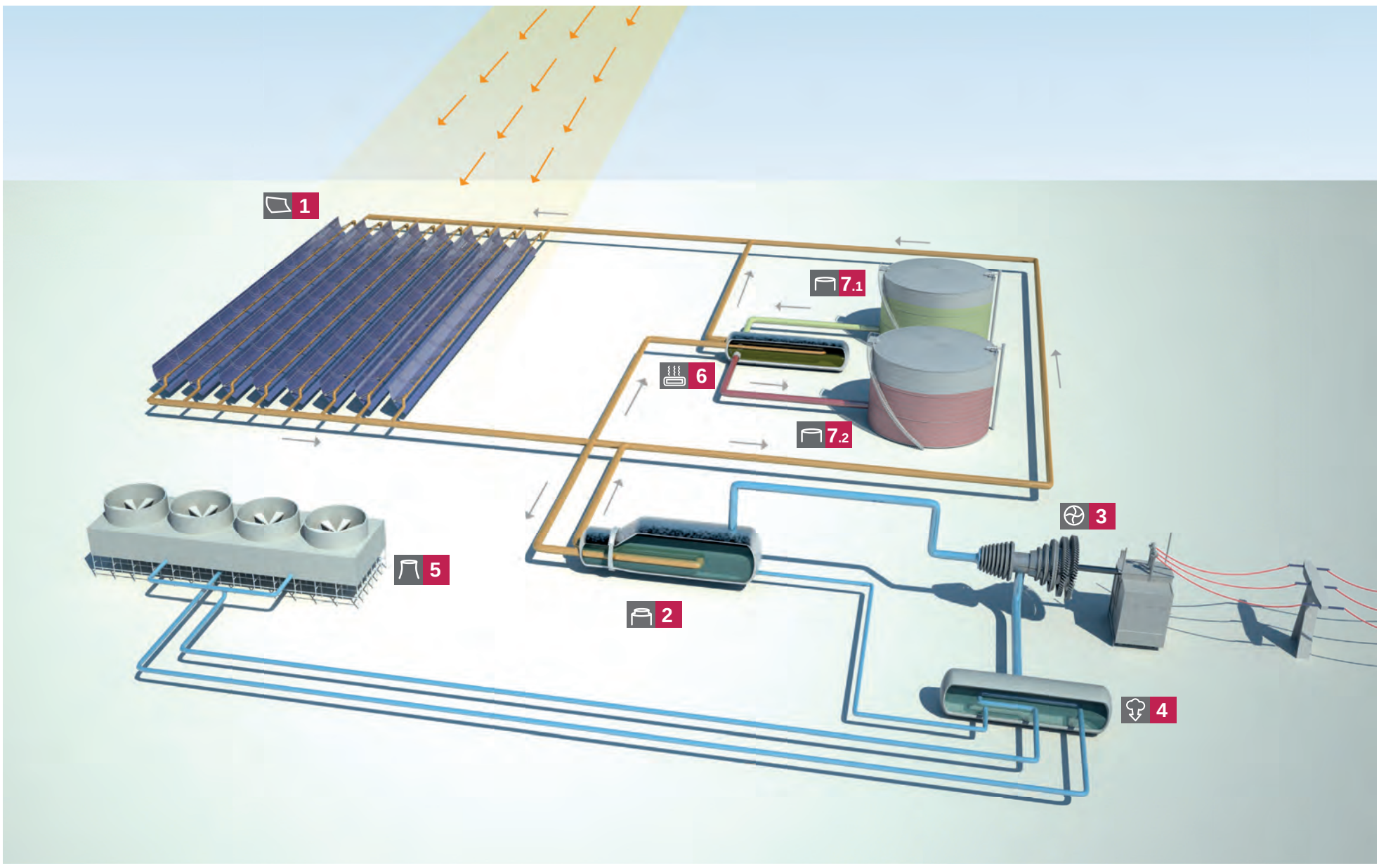
7 Thermal storage system

7.1 To fill up the storage system, cold salt is pumped from the cold-salt tank to the heat exchanger, where the HTF heats it. The salts are then stored in the hot-salt tank.

7.2 During discharge, the stored hot salt is pumped to the same heat exchanger to heat the HTF and continue generating electricity even during periods when there is no solar radiation.

8 Electric Generator

The electricity is delivered to a transformer to be injected into the distribution grid.



SENER
The way to see the future

masen
endless power for progress

www.poweroilandgas.sener