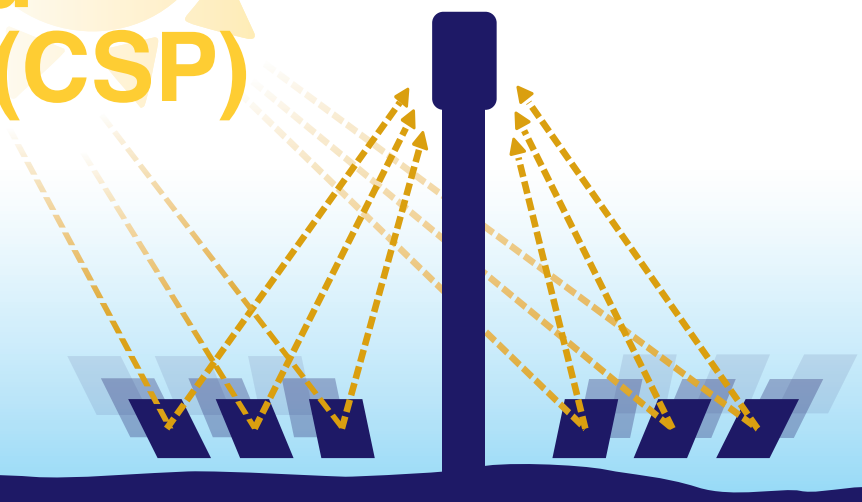
Harnessing the Sun's Energy:

Molybdenum in... Concentrated Solar Power (CSP)

IMOA
THE VOICE OF THE MOLYBDENUM INDUSTRY

CSP collects the sun's energy on a large surface area and concentrates it onto a receiver to convert it into heat, which in turn produces clean energy. This infographic explores the role molybdenum plays.



CSP in the renewable energy mix

CSP uses the collected heat to produce steam in a steam generator, which drives a conventional steam turbine to generate electricity. Its thermal mass naturally smooths out brief dips from passing clouds, and with dedicated storage, it can keep generating power after the sun sets - unlike photovoltaic panels, which need direct sunlight to produce power.

7.2 GW

is the total of global installed CSP capacity in 2024.

Source: Ren21

$45.65 billion

The global CSP market size was worth around USD 10.17 billion in 2025 and is anticipated to reach around USD 45.65 billion by 2034.

Source: Precedence Research

Molybdenum in CSP

CSP plants face extreme conditions: intense concentrated heat, repeated daily heating and cooling cycles, and prolonged contact with corrosive molten salts, often in desert or coastal sites. Receivers in particular depend on molybdenum-containing alloys for reliable, long-term performance under these harsh operating conditions.

Molybdenum in the main types of CSP solar fields

1

Parabolic troughs

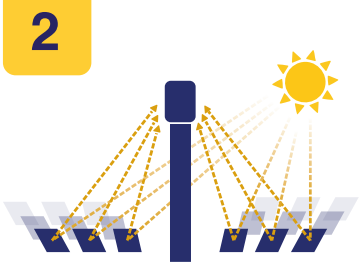
Parabolic trough systems have curved reflective, mirrors that focus sunlight onto heat-absorbing, linear receiver tubes. Because sunlight is concentrated along a line rather than to a single point, achievable temperatures are relatively limited, typically below 400°C. The heat transfer medium is usually a synthetic thermo-oil, which in older or simpler plants flows directly to the steam generator to run the turbine. However, the trend has shifted towards trough plants having thermal storage instead, often incorporating two-tank molten salt storage.

Where Molybdenum is used

The receiver tubes consist of heat-resistant stainless steel tubes with a selective absorber coating and sealed in evacuated borosilicate glass tubes.

Molybdenum-containing Type 316L is one of the three main stainless steel alloys used for the receiver tubes because of its resistance to elevated temperatures and pressure. Molybdenum is also used in some selective absorber coatings to improve high-temperature performance.

2



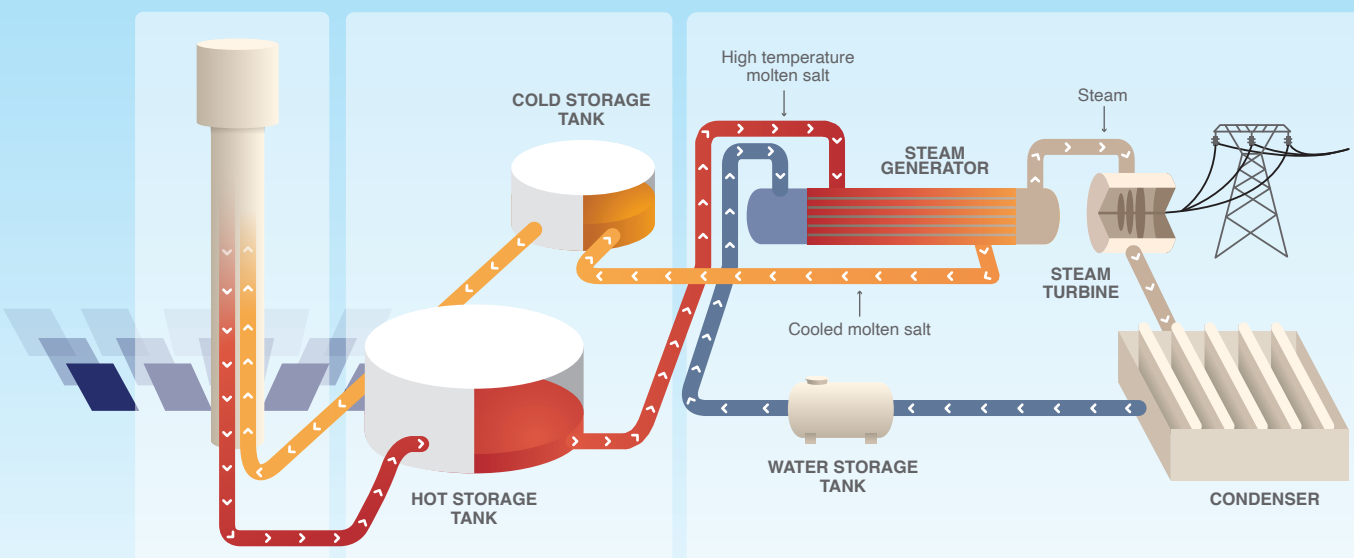
Solar power towers

Solar power towers use thousands of mirrors (heliostats) to focus sunlight onto a central receiver, which captures heat via a heat transfer medium, usually molten salt, steam or compressed air. Because heliostats concentrate sunlight onto a single point, operating temperatures are well above 500°C. Steam-based towers generate electricity directly, without storage. Molten salt, by contrast, enables thermal storage: hot salt is directed to the steam generator when electricity is needed, and the cooled salt (still around 290°C, hence the "cold" tank) is returned to be reheated and reused.

Where Molybdenum is used

Molybdenum-containing alloys 625 (UNS N06625) and 230 (N06230) are often used in the receiver tubes for their creep resistance, thermal stability, and corrosion resistance in contact with molten salts.

Illustration of a solar power tower CSP plant with molten salt thermal storage



DID YOU KNOW?

Molybdenum's role in CSP doesn't stop at the receiver: in the power block, molybdenum-containing steels are also used for high-temperature components in steam generators, piping, and turbines, providing the creep strength needed for reliable, long-term operation under pressure.

Further information on the use of molybdenum in Power Generation can be **found here.**