Water Resources Optimization in Industrial Systems

In the context of the energy transition, water saving presents important challenges. The Generation of electrical energy through Steam Turbines – used mainly in nuclear, solar thermal and fossil fuel plants – involves considerable consumption of water resources.

The importance of reducing water consumption in these processes lies in the need to optimize the energy efficiency of the plants without overusing the available water resources.

A significant part of the water consumption in this type of plants is due to the losses caused in the cooling circuits. This consumption is due to evaporation, carryover and purges in the cooling tower, and leaks in the system. These water losses for a 100 MW plant are generally in the range of 150 – 250 m^3/h.

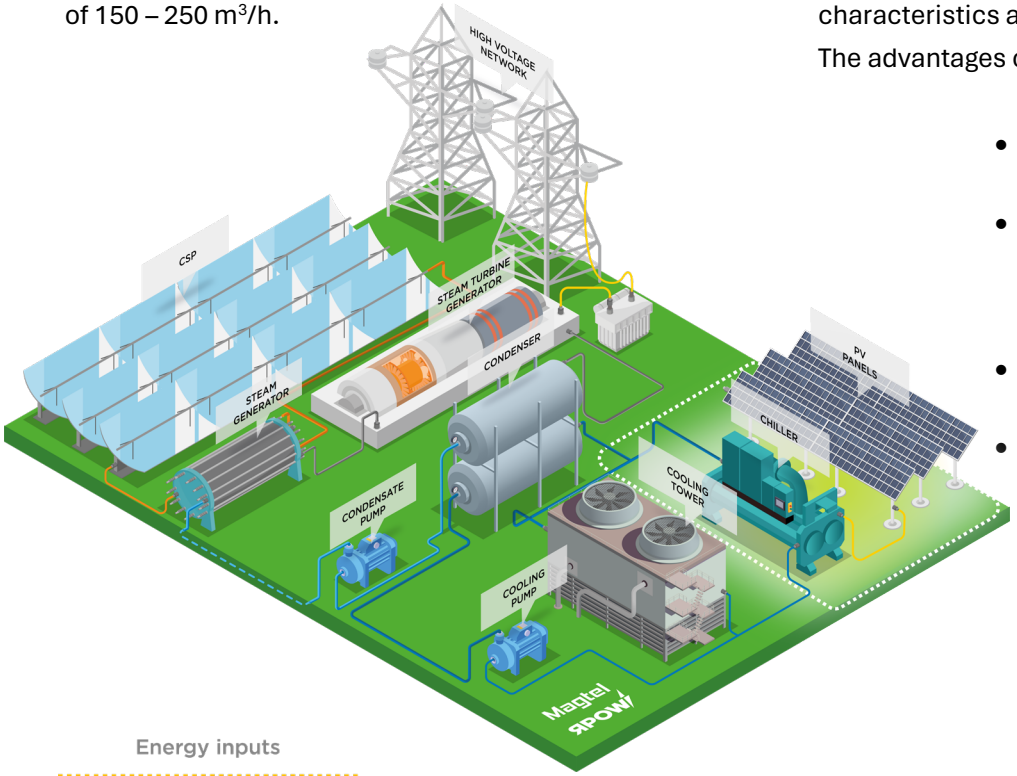
As a solution, RPow and Magtel propose to reduce the thermal cooling load of the Tower by implementing an Electric Chiller, installed before the Cooling Tower. This Chiller would have the function of cooling part of the water flow – which is diverted to the Chiller – thus reducing the necessary flow in the Cooling Tower.

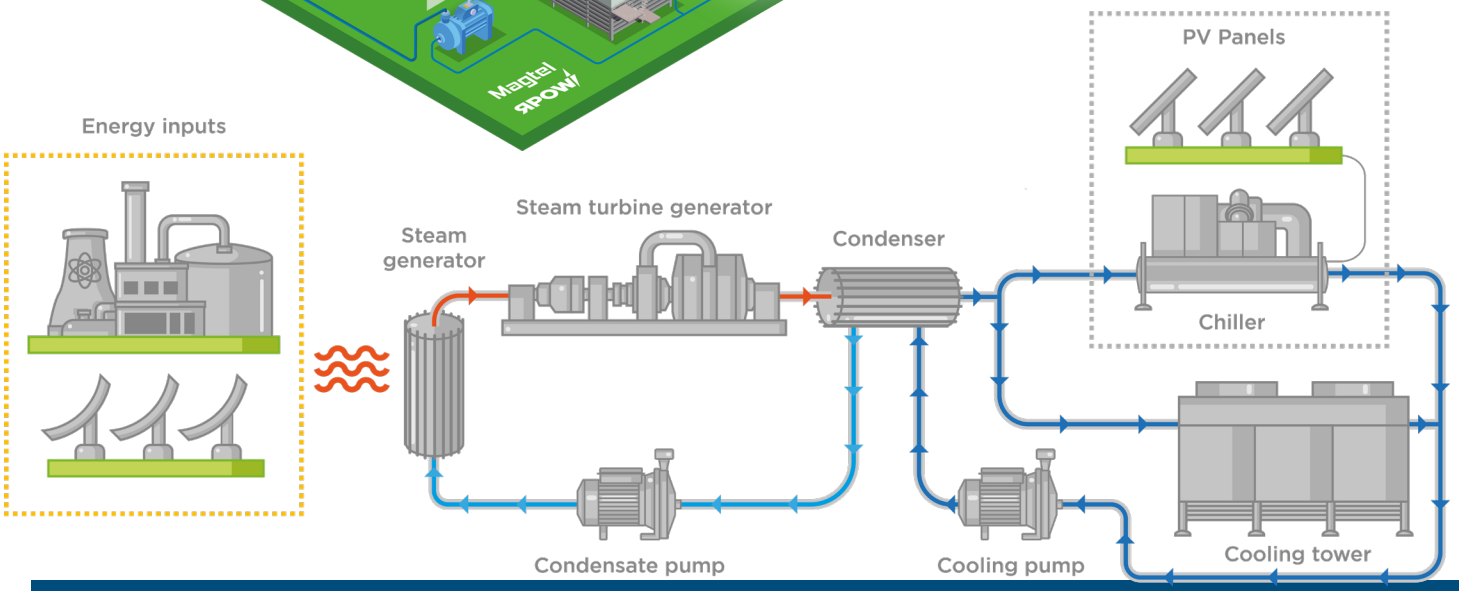
These Chillers can be either water or air cooled, depending on the specific needs and characteristics of the plant.

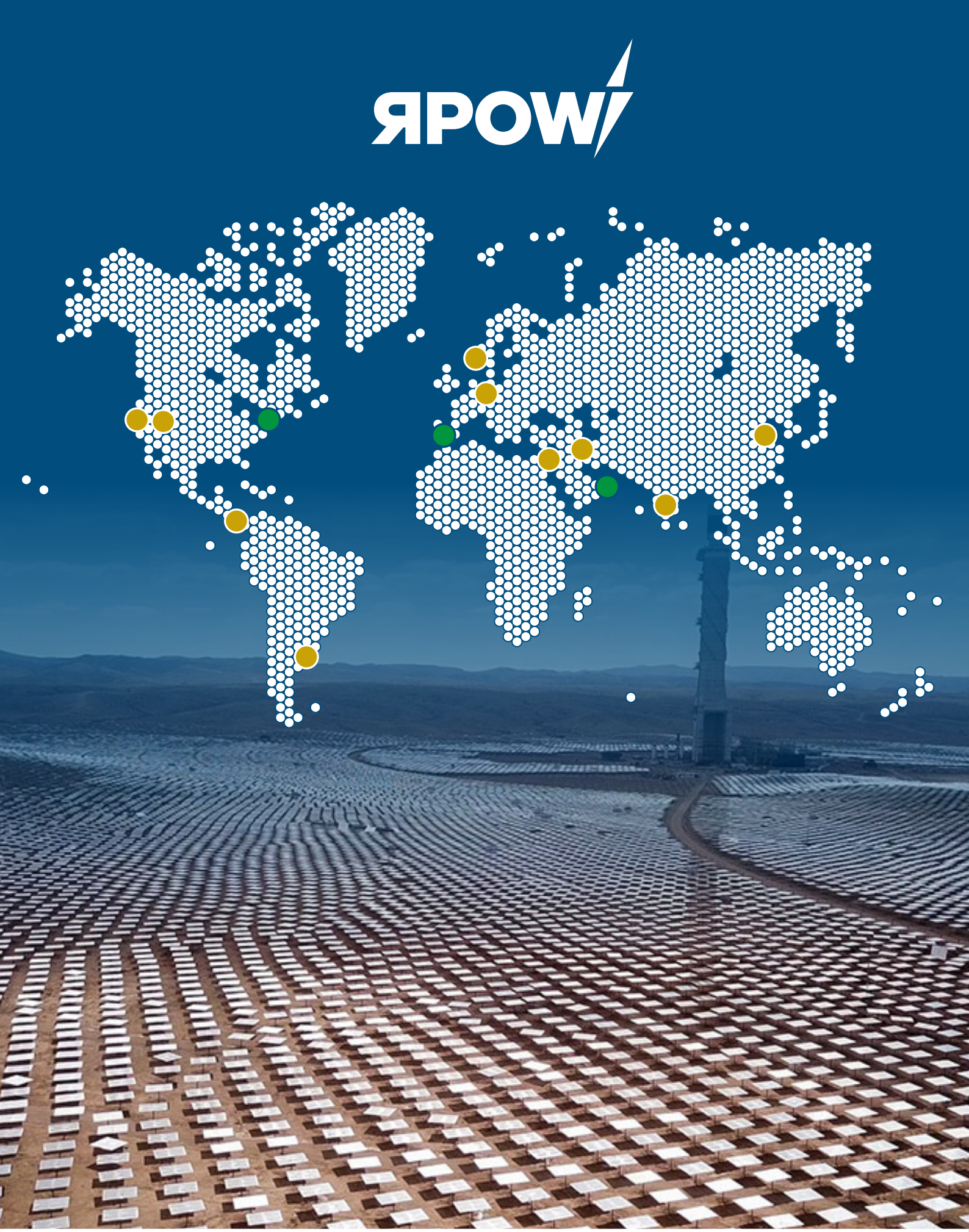
There is the option of installing an attached photovoltaic plant to cover the electrical demand of the chiller and not compromise the remuneration regime of the plant, allowing the sale of all electrical generation. However, the power supply to the chiller will depend on the specific characteristics and needs of the customer.

The advantages of this approach are summarized in:

- Reduction in water consumption for plant cooling by 25 – 45%.
- For a 100 MW plant operating 24 hours a day, the water equivalent to an Olympic swimming pool per day could be saved.
- Savings in products consumption for chemical water treatment.
- Guarantees the operation of the plant in the event of cuts in the associated water concession.







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