



CADEIA DE VALOR NA ENERGIA HELIOTÉRMICA

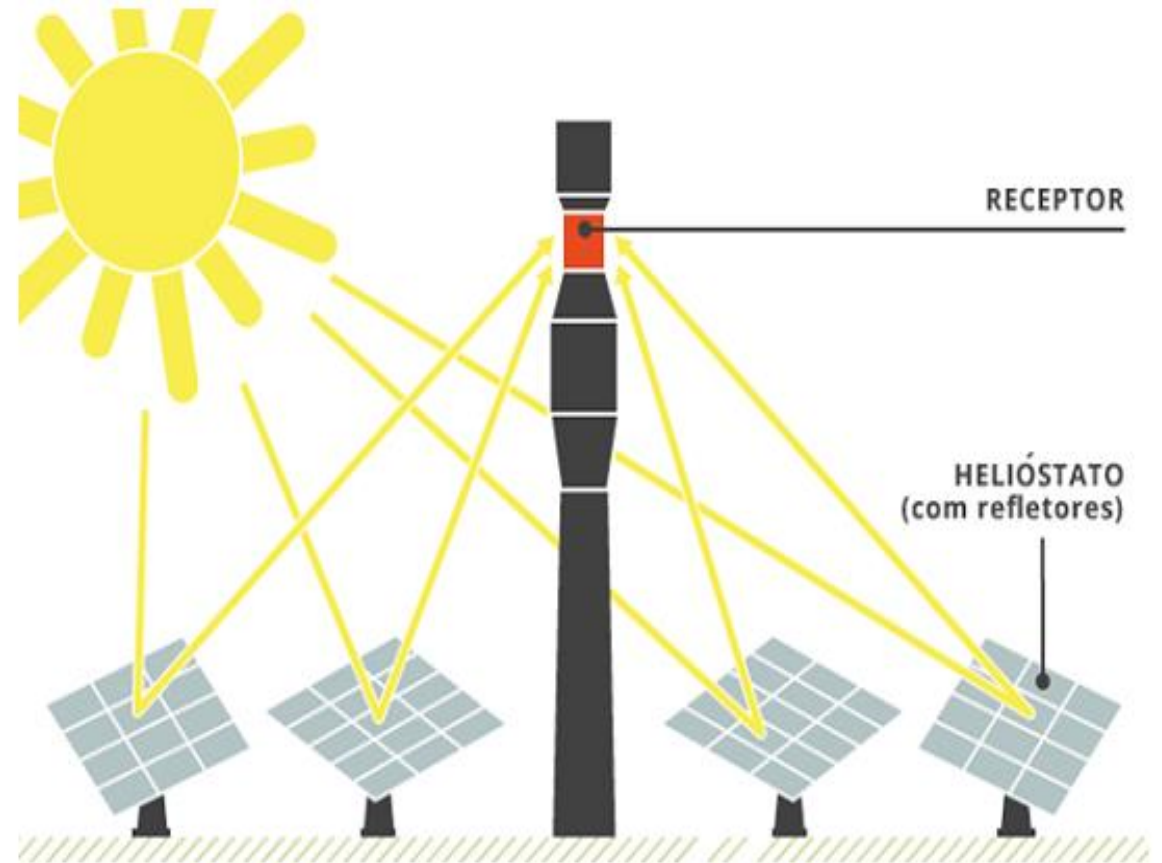
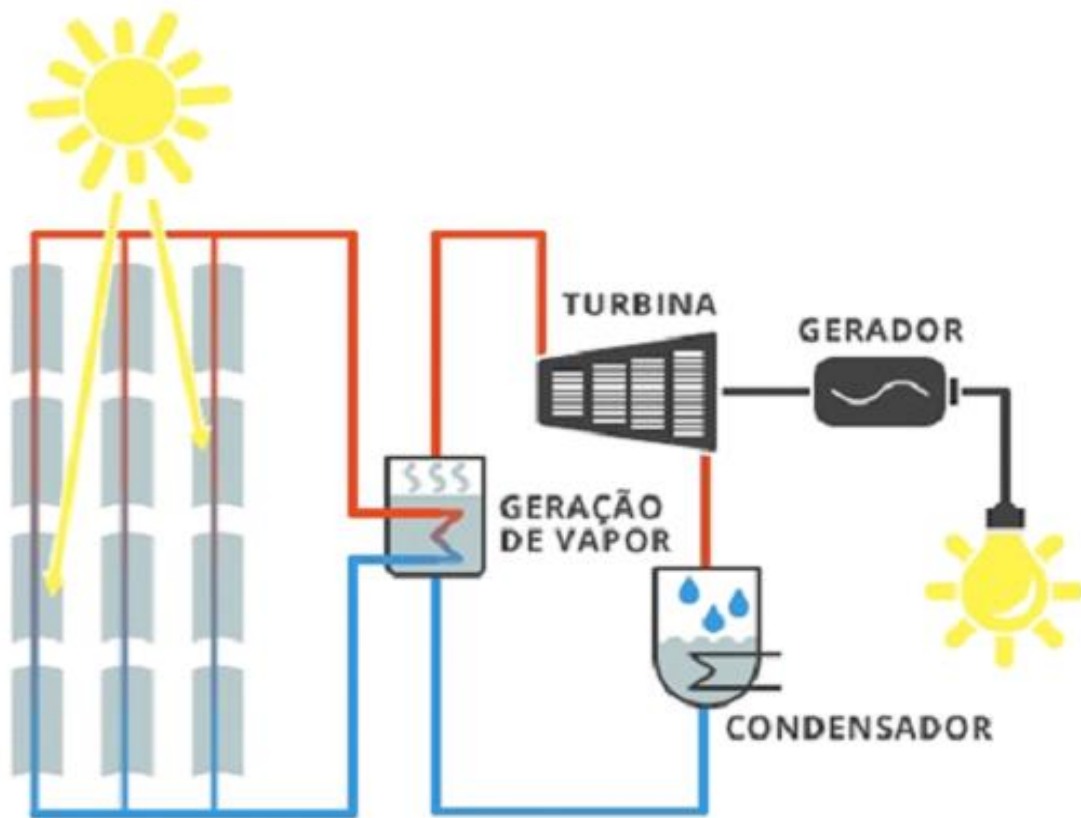


TURBINA A VAPOR



TURBINA A VAPOR - CSP

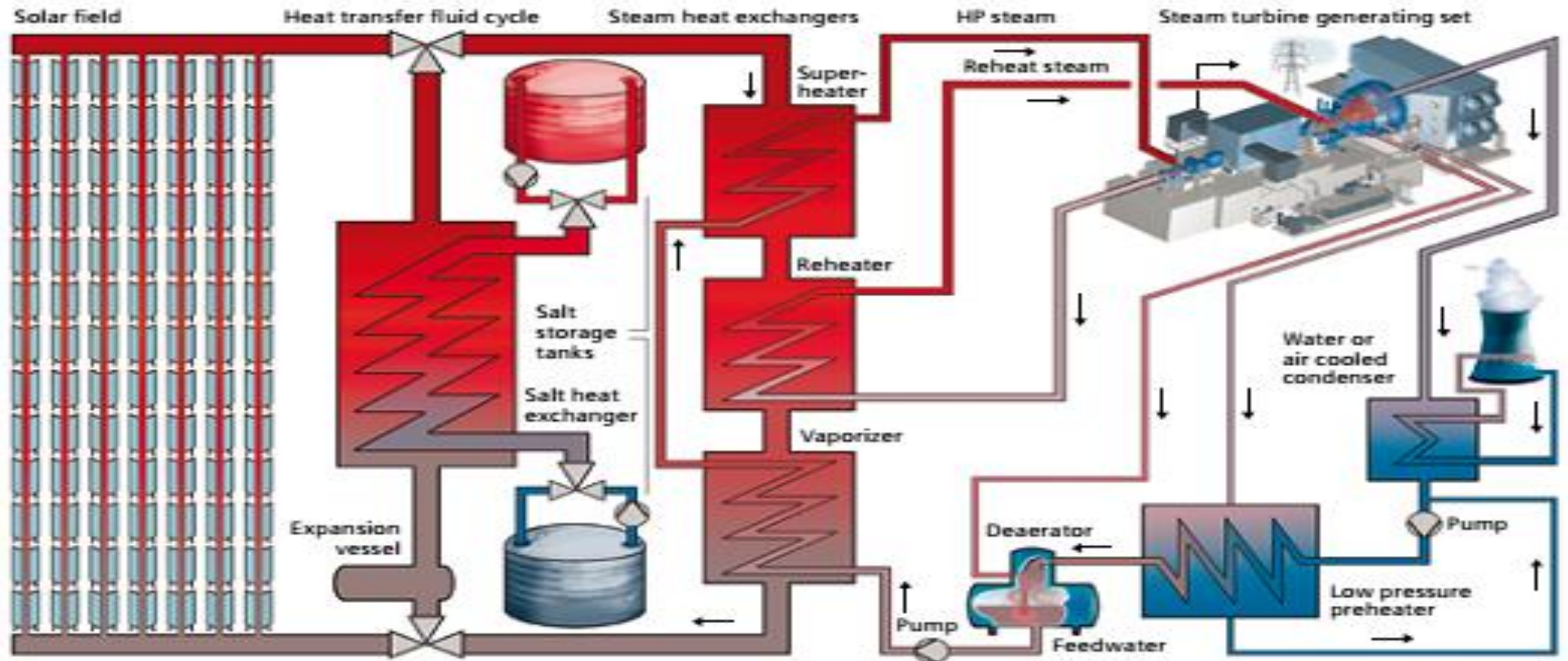
UTILIZAÇÃO APENAS DO CALOR SOLAR
VAPOR SATURADO OU SUPERAQUECIDO



TURBINA A VAPOR - CSP

UTILIZAÇÃO APENAS DO CALOR SOLAR

VAPOR SUPERAQUECIDO COM ACUMULADOR TÉRMICO.



TURBINA A VAPOR - CSP

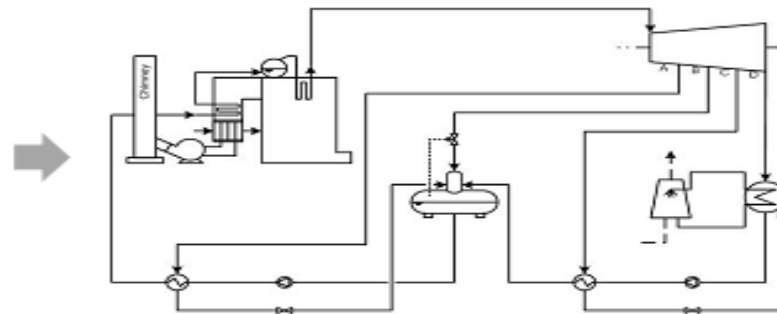
UTILIZAÇÃO DE SOLAR COM QUEIMA SUPLEMENTAR
VAPOR SUPERAQUECIDO.

- Hybridization of conventional power plants with Concentrated Solar Power (CSP)¹

Solar concentrators¹



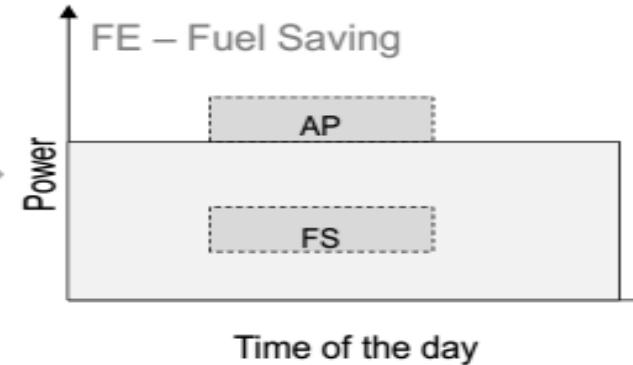
Conventional plants



Operation strategies

AP – Additional Power

FE – Fuel Saving



Characteristics

- Reduction of the capital costs
- Operation flexibility
- Possibility of solar base load power supply
- Minimization of fuel availability problems

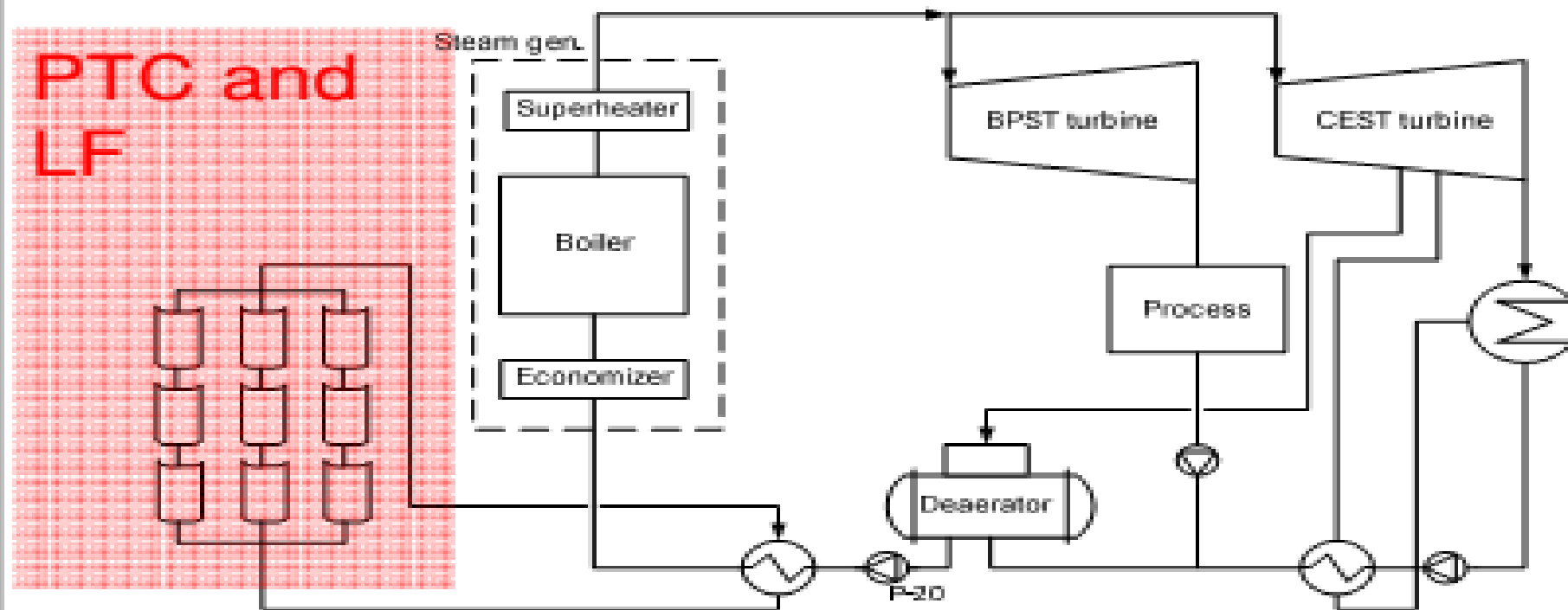
¹TORRESOL. June 2015. Available in: <<http://torresolenergy.com>>.

TURBINA A VAPOR - CSP

UTILIZAÇÃO DE SOLAR COM QUEIMA SUPLEMENTAR

VAPOR SUPERAQUECIDO + REGENERATIVO SOLAR

Feedwater heating



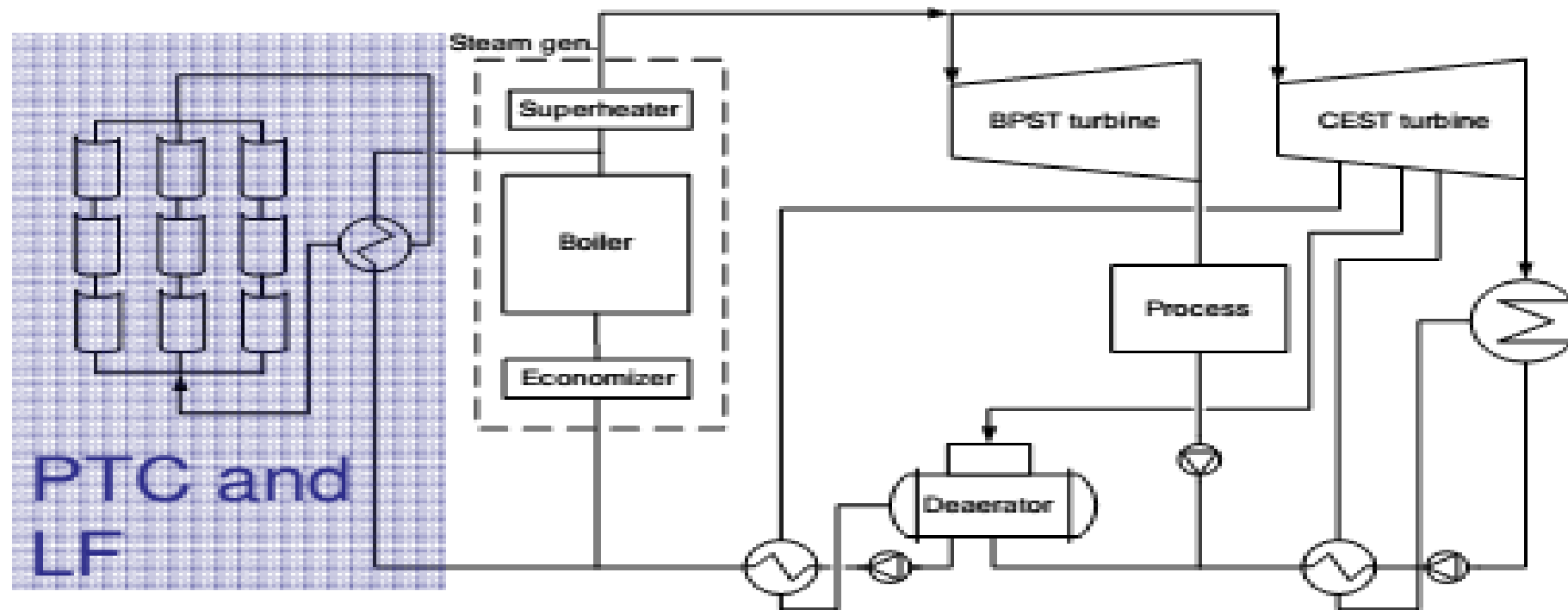
Feedwater heating to 200 °C

TURBINA A VAPOR - CSP

UTILIZAÇÃO DE SOLAR COM QUEIMA SUPLEMENTAR

VAPOR SATURADO PARA O SUPERAQUECEDOR DA CALDEIRA.

Saturated steam

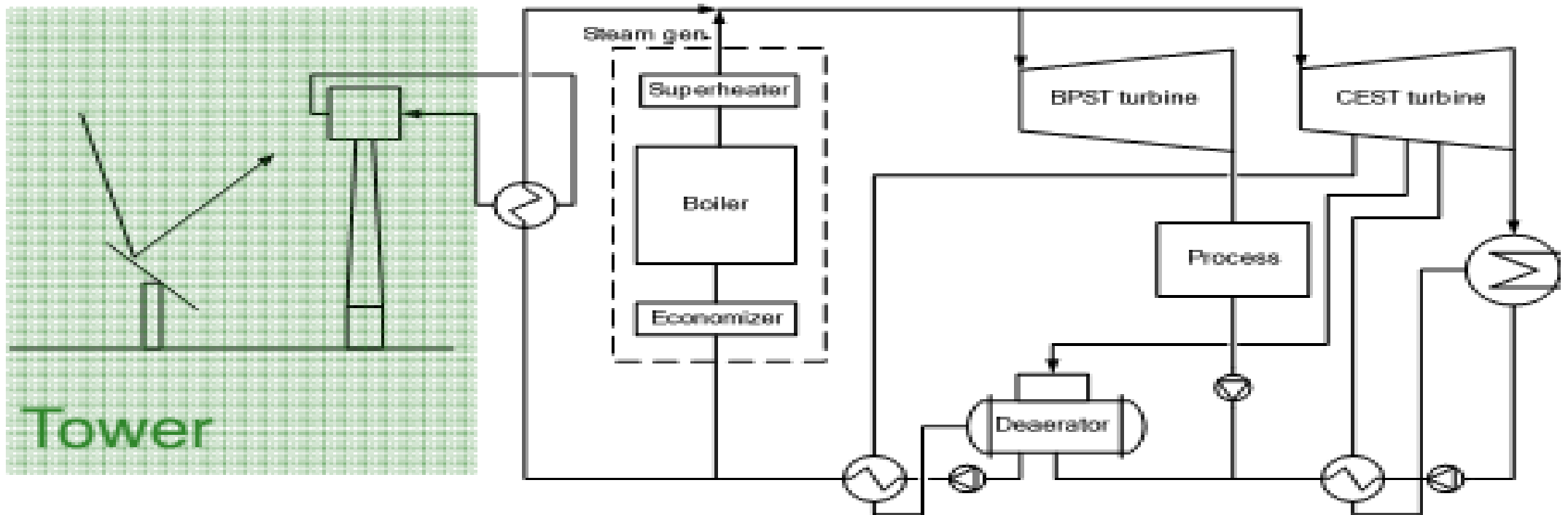


Saturated steam 283 °C (67 bar)

TURBINA A VAPOR - CSP

UTILIZAÇÃO DE SOLAR COM QUEIMA SUPLEMENTAR
VAPOR SUPERAQUECIDO EM LINHA COM A CALDEIRA.

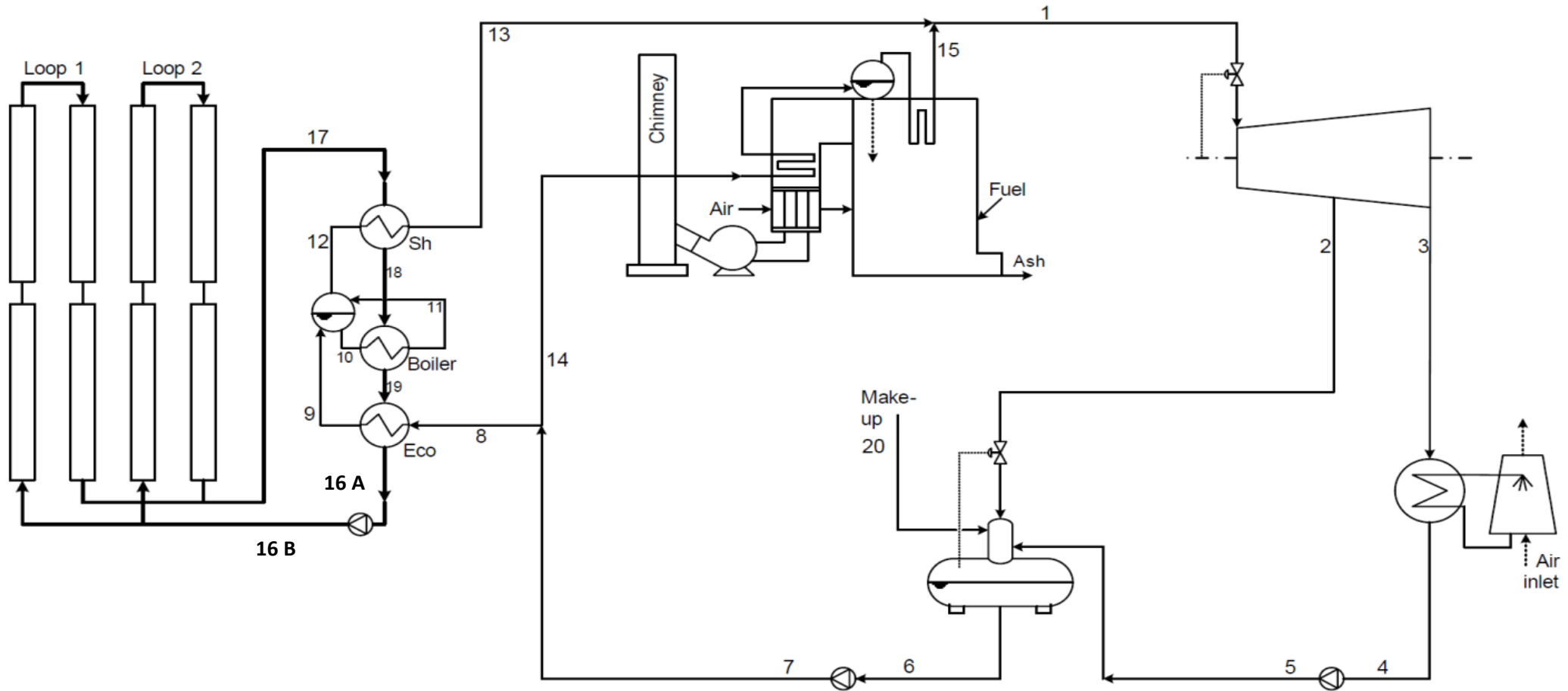
Superheated steam



Superheated steam 525 °C / 67 bar

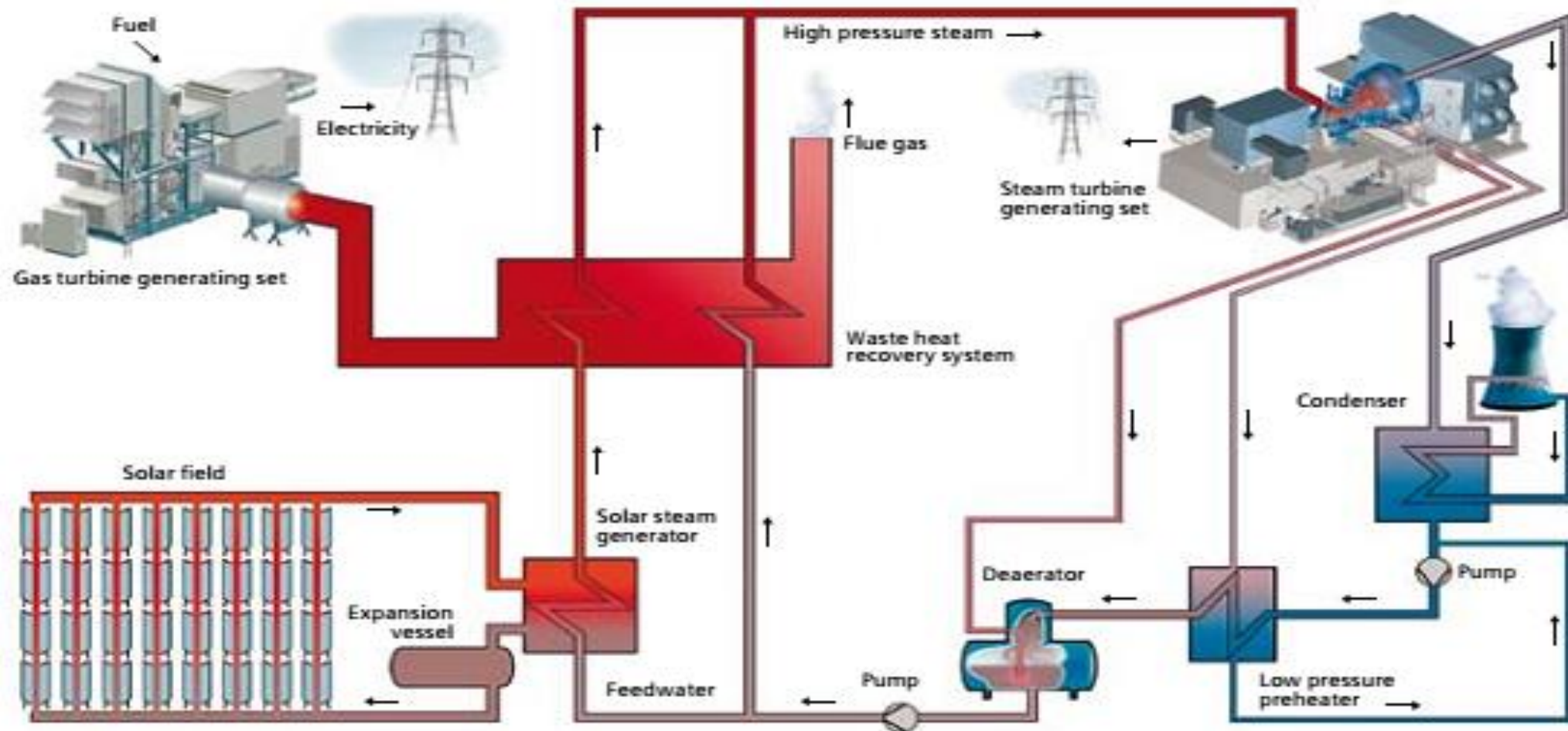
TURBINA A VAPOR - CSP

UTILIZAÇÃO DE SOLAR COM QUEIMA SUPLEMENTAR
VAPOR SUPERAQUECIDO EM LINHA COM A CALDEIRA.



TURBINA A VAPOR - CSP

UTILIZAÇÃO DE SOLAR COM CICLO COMBINADO
VAPOR SUPERAQUECIDO.



OBRIGADO!



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