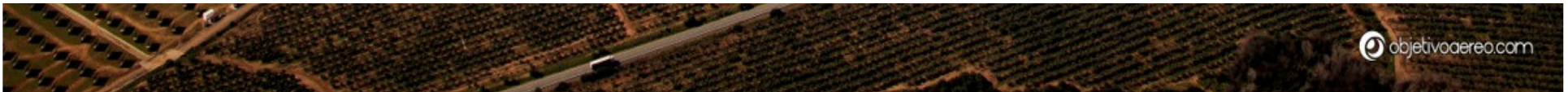




CSP La Africana O&M

Daniel Quiñones Garcia
Operation Manager



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WE ARE HERE

SPAIN

CORDOBA

CSP LA AFRICANA



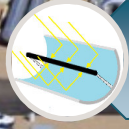
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FEATURES

SOME FEATURES



55 MW STEAM TURBINE



168 LOOPS SOLAR FIELD



950 MWht MOLTEN SALTS STORAGE



45 MWt ON 3 GAS BOILERS



LOW WATER DEMAND RATIO ($<6\text{m}^3/\text{MWh}$)



UP TO 180 GWh_e GENERATED YEAR



54 DAYS OF 24H CONTINUOUS OPERATION LAST YEAR

PRODUCTION PERSPECTIVE

- MOLTEN SALTS MAKES THE DIFFERENCE
- 24H OPERATION ENLARGES LIFE CYCLE OF THE PLANT

MAINTENANCE PERSPECTIVE

- USE PREDICTIVE MAINTENANCE
- CLEAN MIRRORS ON DEMAND
- USE STATE OF THE ART TECHNOLOGIES



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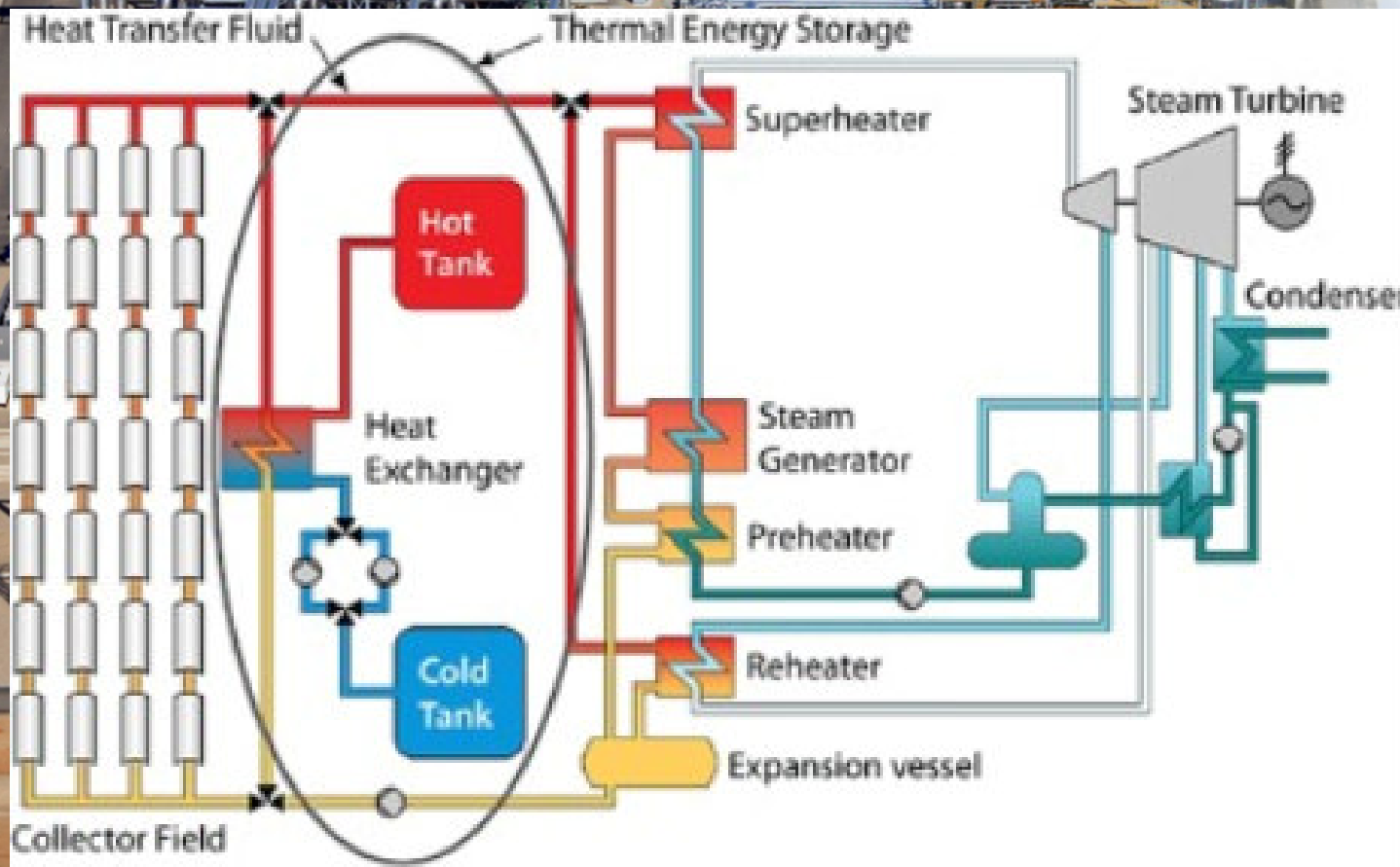
LESSONS
LEARNED

PRODUCTION PERSPECTIVE

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MOLTEN SALT
STORAGE MAKES
THE DIFFERENCE

HOW IT WORKS





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MOLTEN SALTS
STORAGE MAKES
THE DIFFERENCE

PRODUCTION BENEFITS

MANAGE ENERGY DISPATCH

COVER CLOUDS DNI FALLS

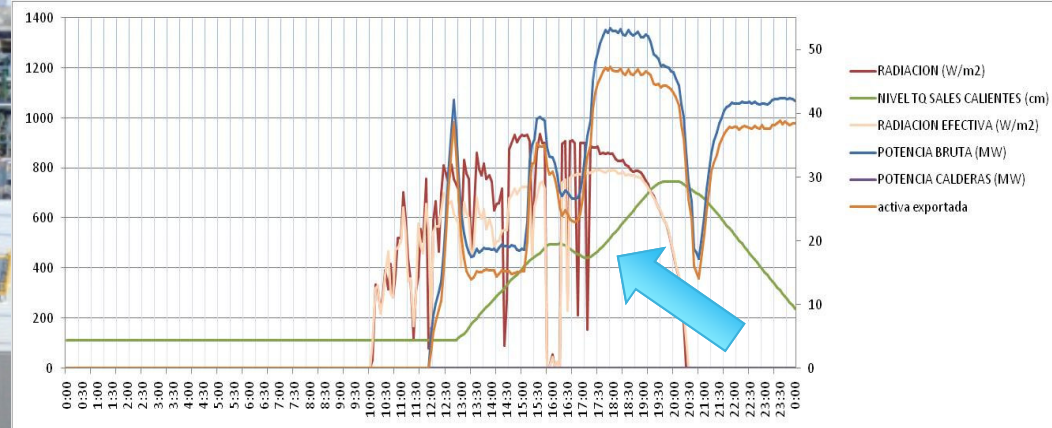
OPTIMIZE ECONOMIC INCOME

ALLOWDS 24H CONTINUOUS OPERATION

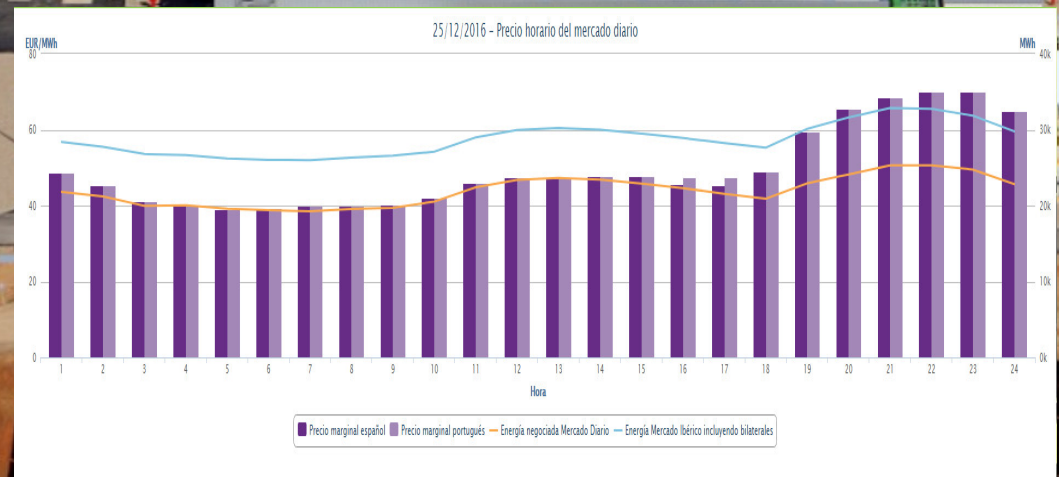
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MOLTEN SALTS STORAGE MAKES THE DIFFERENCE

COVER CLOUDS DNI FALLS



OPTIMIZE ECONOMIC INCOME



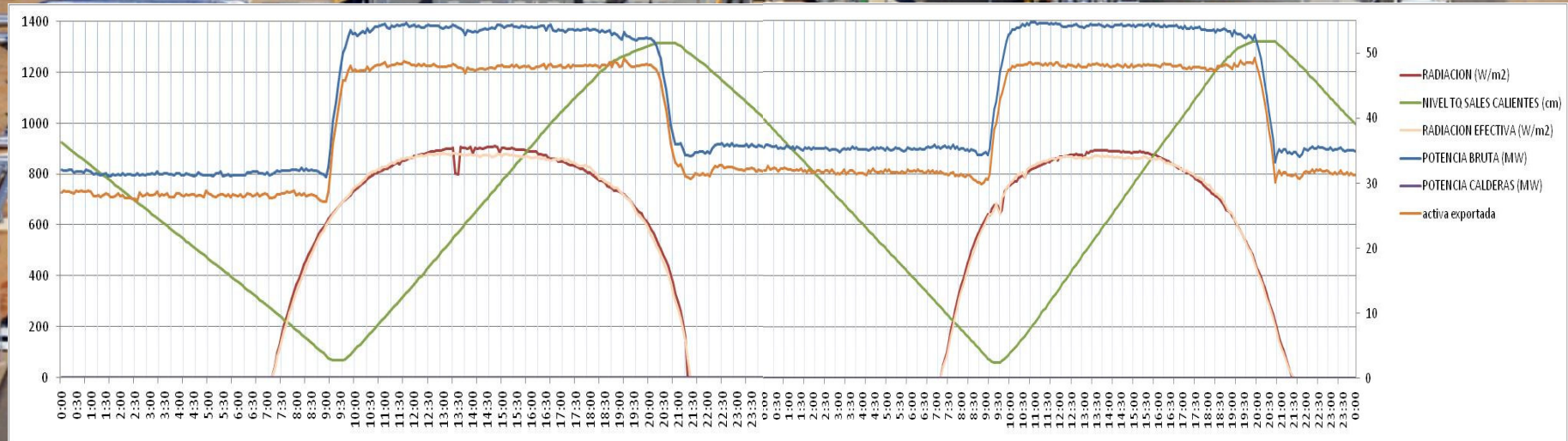
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24H OPERATION

• 24H OPERATION FEELS GOOD FOR THE PLANT

12/06/2017

13/06/2017



PRODUCTION BENEFITS.

EFFICIENCY DROP BY REDUCING PLANT POWER VS NONE START UP ENERGY LOOSES

MAINTENANCE BENEFITS

$$EOH = NUM\ STARTs \times K + RUNNING\ HOURS$$

COSTS BENEFITS

AUXILIARY SUPPLIES REDUCTION;

- GAS. REDUCE AUXILIARY BOILER DEMAND WHILE AUTOSEALED TURBINE (OVER 90% ▼)
- ELECTRIC POWER. NO OFLINE CONSUMPTION WHILE IN ISLAND MODE (AROUND 70% ▼)
- WHATER CONSUMPTION, REDUCING INTERMITENT PURGES ON PLANT STARTS

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24H OPERATION

- THE MORE 24H OPERATION, THE BETTER





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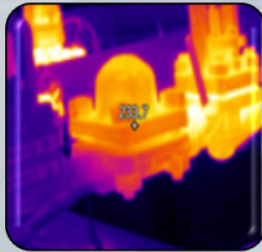
LESSONS
LEARNED

MAINTENANCE PERSPECTIVE

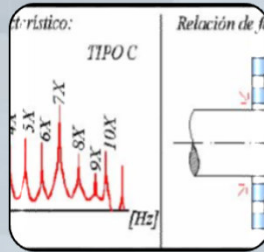
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USE PREDICTIVE TECHNIQS

- WILL REDUCE MAINTENANCE COST
- WILL INCREASE UPTIME OF THE PLANT
- MAINTENANCE ON DEMAND USING FOLLOW UP TECHNIQS



THERMAL
IMAGES
ANALYSIS



VIBRATIONS
FREQUENCY
SPECTRUM
ANALYSIS



OIL CHEMICAL
PARAMETERS
ANALYSIS



ULTRASOUNDS
ANALYSIS



VIDEOSCOPE
INSPECTIONS

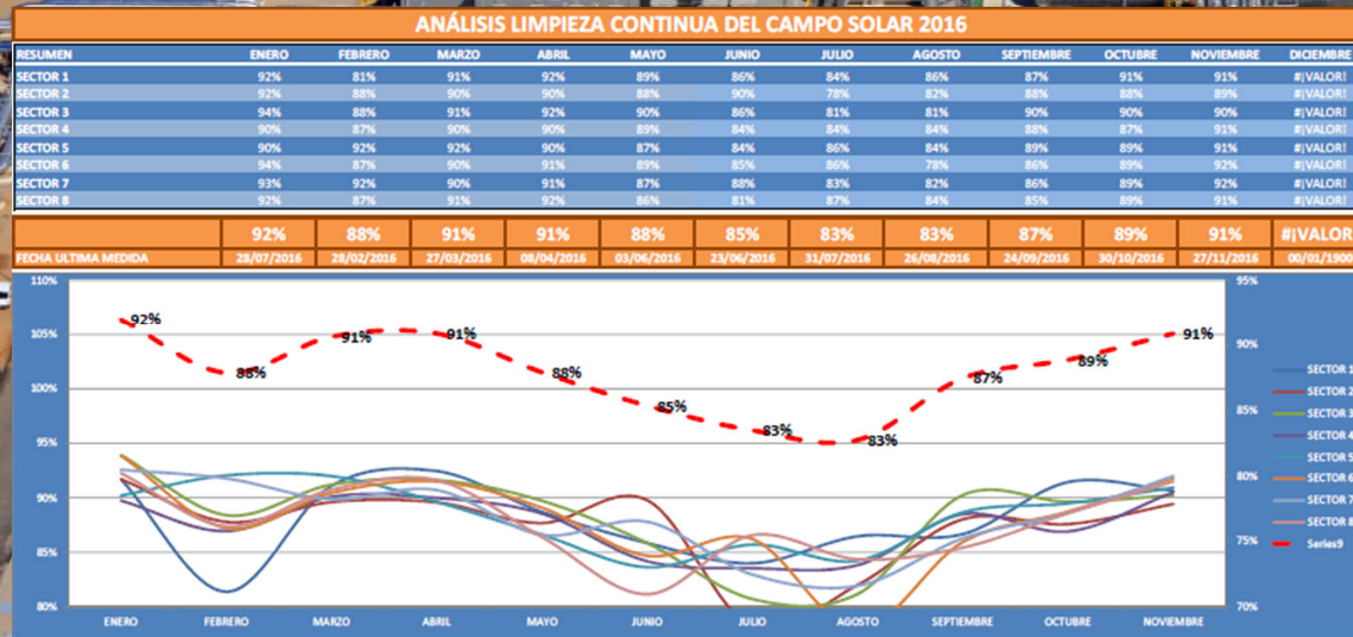


MIRRORS
REFLECTIVITY

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MIRRORS CLEANING ON DEMAND

- MIRRORS REFLECTIVITY TRENDING FOLLOW UP



- CLEAN ONLY WHEN REFLECTIVITY COMES DOWN

- SOME MIRRORS CLEANING FEATURES:

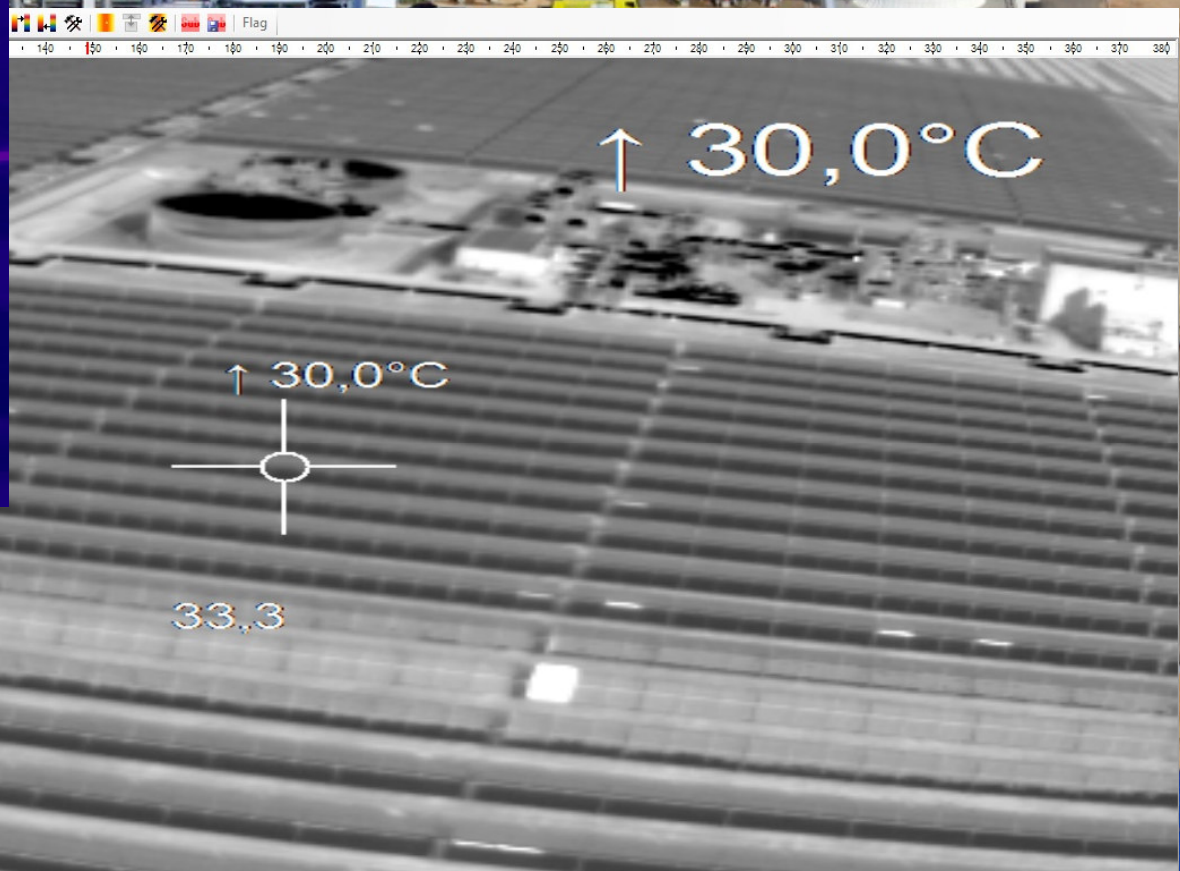
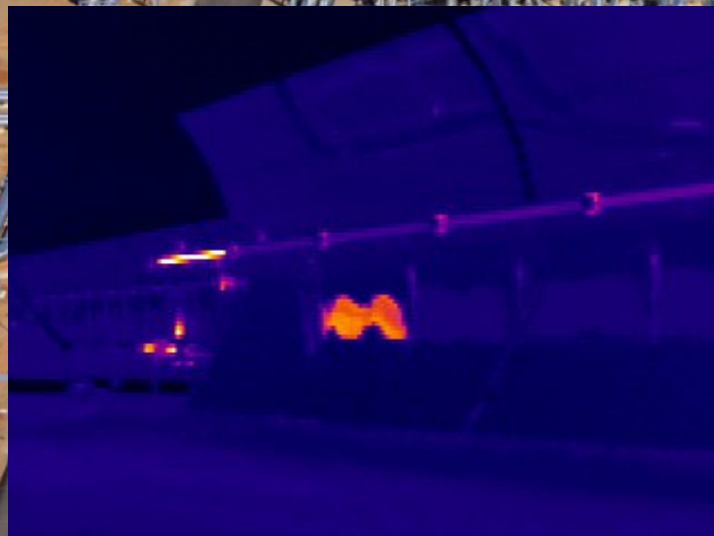
- 12 LOOPS PER NIGHT & CLEANING TRUCK
- 2 M3 WATER CONSUMPTION PER LOOP



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STATE OF THE ART TECHNIQS

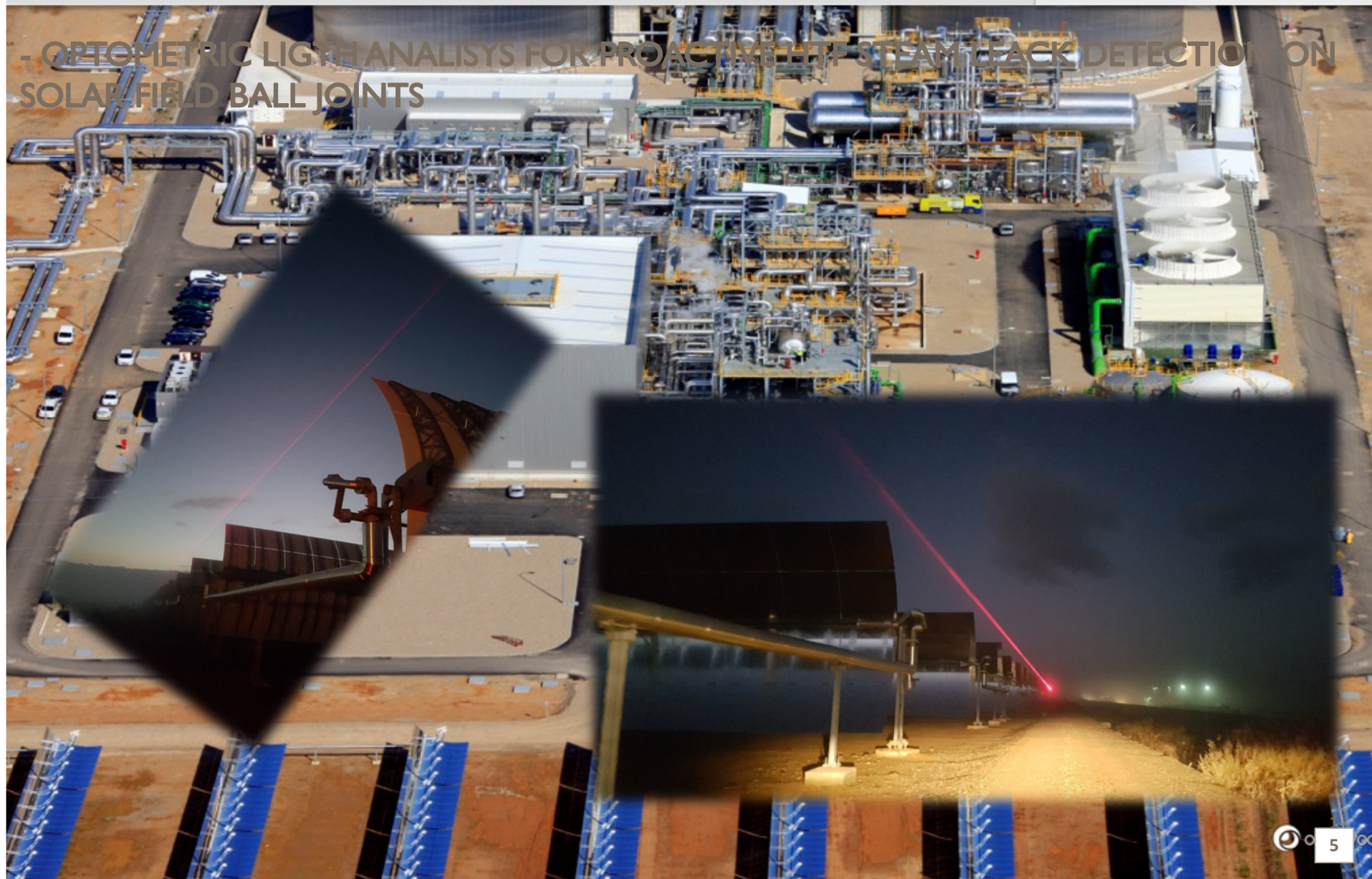
- DRONE AND AUTOMATIC IMAGE RECOGNITION FOR TUBES BREAKAGES



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STATE OF THE ART TECHNICS

- OPTOMETRIC LIGHT ANALYSIS FOR PROACTIVE HTF STEAM LEAK DETECTION ON SOLAR FIELD BALL JOINTS





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THANKS FOR YOUR ATTENTION

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