



# EU GCC CLEAN ENERGY NETWORK II

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## Status of CSP developments in the GCC and the role of the European CSP industry

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November 2017

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# content

## 1. Status of CSP in the GCC

- Abu Dhabi – SHAMS 1
- Kuwait – Shagaya
- Oman – Miraah
- KSA – Duba and Waad Al Shamal
- Dubai – Maktoum Solar Park Phase IV

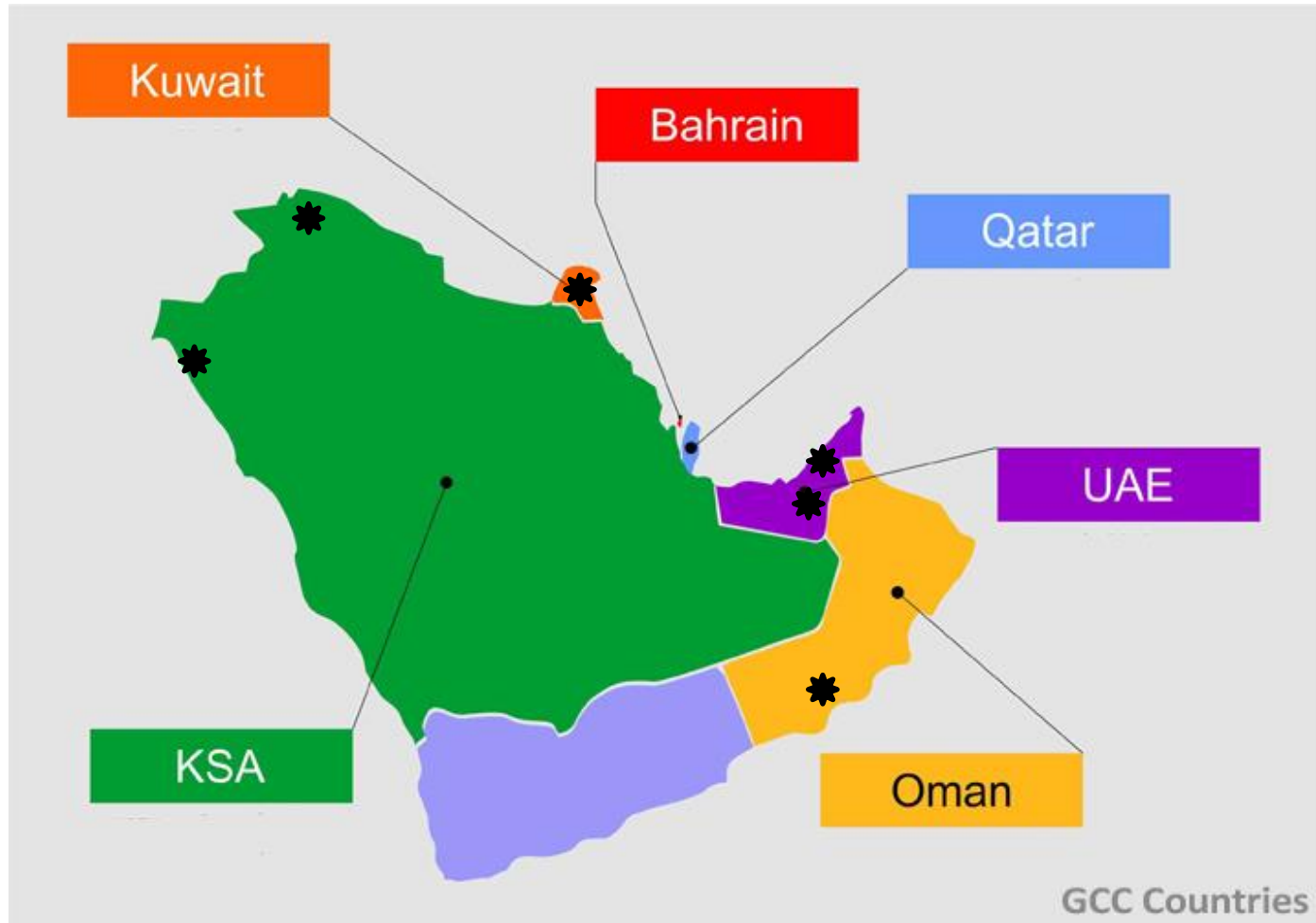
## 2. Role of the European Industry

# STATUS of CSP in the GCC

1



# GCC



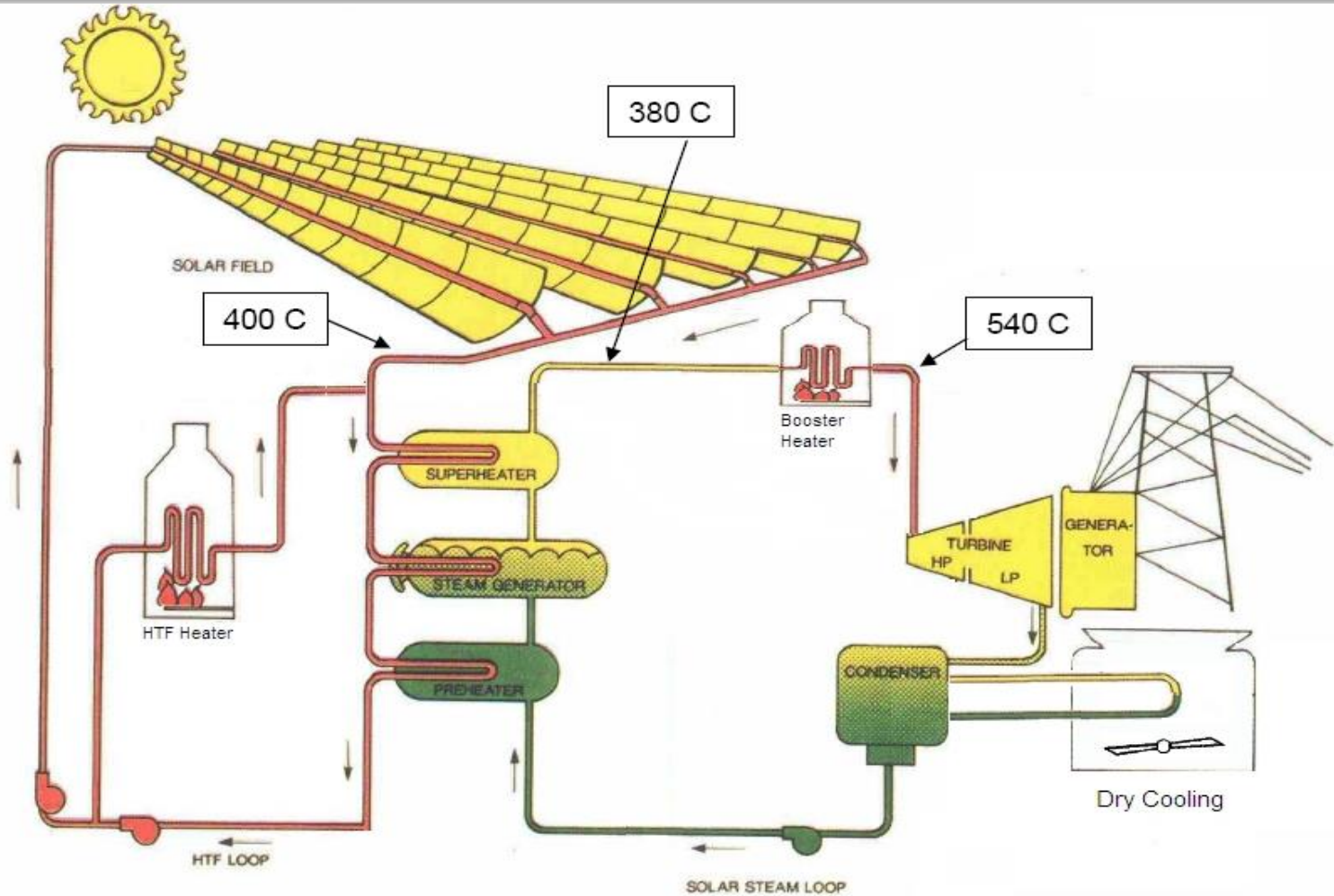
# CSP in the desert



# Abu Dhabi - Shams 1



# Abu Dhabi - Shams 1

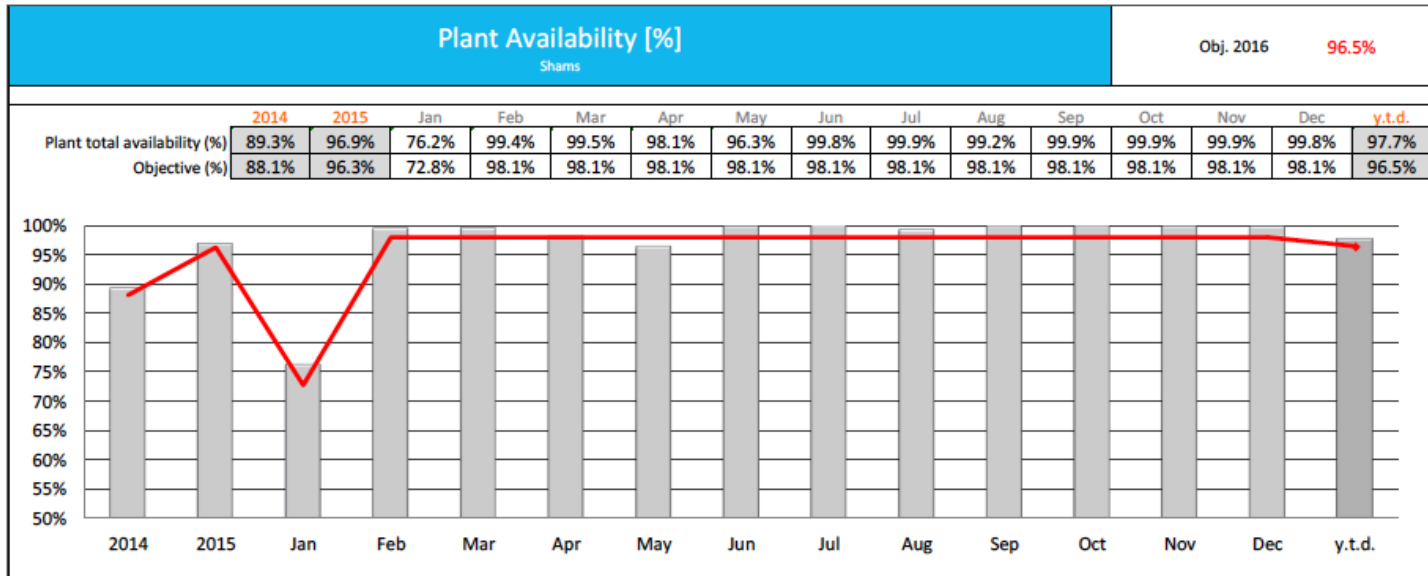


# Shams 1 - Operations

## Maintenance Records (1/2)

► **Plant availability and reliability:** The plant reliability (availability excluding scheduled outages) has been 99.5%. Including January 2016 scheduled outage, the plant total availability has been 97.7%, significantly above the expectations and previous years.

	Reliability	Total availability
2014	96.2%	89.3%
2015	98.2%	96.9%
2016	99.5%	97.7%





# Shams 1 - Operations

## Maintenance Records (2/2)



- ▶ The solar field is cleaned in average once a week using 5 cleaning trucks and cleaning 6 days a week only during the night.
- ▶ The average cleanliness of the plant is 97% which is above the performance/financial Model reference of 95%.





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# Kuwait - Shagaya



## PHASE I:

- **50 MW CSP** Plant – TSK
- 10 MW PV Plant - TSK
- 10 MW Wind Farm – Elecnor/Alghanim/Gamesa
- Overhead Line - Inabensa
- Substation – Larsen and Toubro
- Site Infrastructure
  - Access road
  - Administrative building

# Shagaya CSP Plant

- **50 MW CSP** plant
  - Dry cooled
  - 8 hr Thermal Energy Storage
- Contractor: TSK



# Shagaya CSP – Main equipment

- Steam generator system – Siemens Europe (Germany)
- HTF heaters - Europe
- Air cooled condensers Esindus – Europe (Spain)
- Transformers - China
- Molten salt tanks – local fabrication Western Tank (Dubai)
- Main salt pumps - Flowserve - Europe
- HTF pumps – Flowserve – Europe
- HTF Vessels - Overflow tanks - Dongfang - China
- HTF/Salt Heat Exchangers – Lointec – Europe (Spain)
- Solar Field –
  - Structure - Eurotrough (KSA y india)
  - Mirrors – Rioglass – Europe (Spain)
  - Receivers – Schott – Europe
- Water treatment plant – Saypro – Europe (Spain)

# Oman - Miraah



# Saudi Arabia – Duba/Waad Al Shamal



# Maktoum Solar Park Ph. IV - Dubai





# Maktoum Solar Park Ph. IV - Dubai

- 700MW CSP:
  - 100MW central tower
  - 3x200MW parabolic trough
  - Molten salt storage (>11 hours)
- Dispatch between 4pm and 10am
- Tariff of \$73/MWh, 35 year PPA
- Consortium of Acwa Power and Shanghai Electric, majority owned by DEWA
- Many components sourced internationally

# Future GCC CSP Projects

- Dubai/ Abu Dhabi
- Saudi Arabia
- Kuwait
- Oman

# ROLE of the EUROPEAN INDUSTRY

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# European CSP industry

- Of present 5GW capacity, half was built in Spain, largely with Spanish/European companies and technology
- Spanish FIT kept prices high and gave little incentive for innovation
- 2017 breakthrough in CSP was partly driven by China
- Innovation is key, Europe needs to invest more in R&D
- Consider establishing a joint EU/MENA training institute:
  - Technology
  - Markets
  - O&M
  - Projects: Development/Finance

Thank You!