

The Desert of Egypt as Everlasting Power House

Presentation at the Bibliotheca Alexandrina

BioVision Alexandria, 15 April 2008

by

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www.nokraschy.net

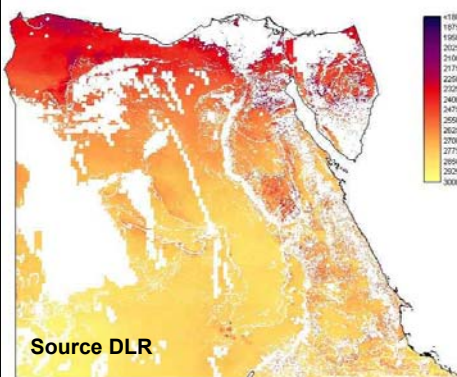
www.solarec-egypt.com

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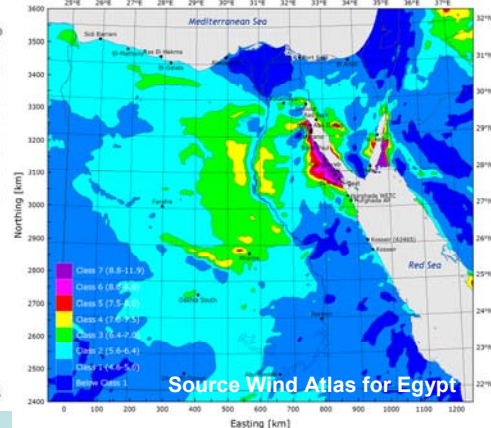
Egypt enjoys excellent
Renewable Energy Resources

Hydro Power from the Nile: **Potential 15 TWh/year**

Electricity Demand 2007 ~100 TWh/y → **~630 TWh/year 2050**



Direct Normal Irradiance
up to 3200 kWh/m²/year
Potential 73 656 TWh/year

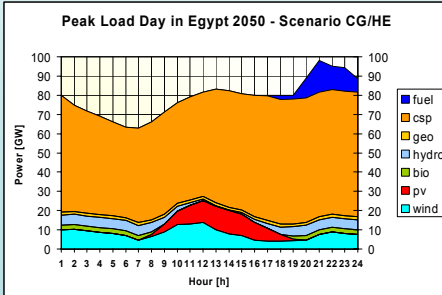
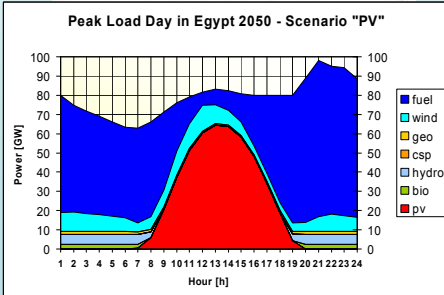
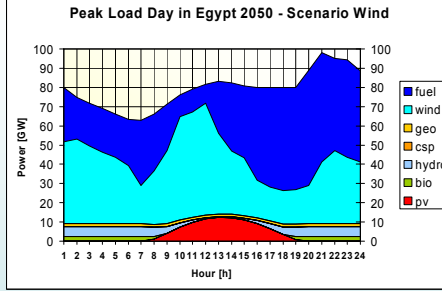
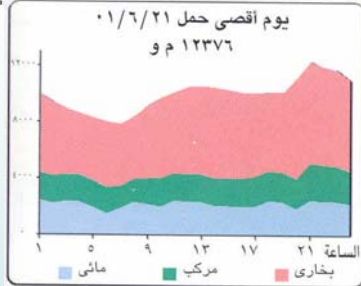


Wind speed up to 12 m/sec
Potential 90 TWh/year

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Load Characteristics

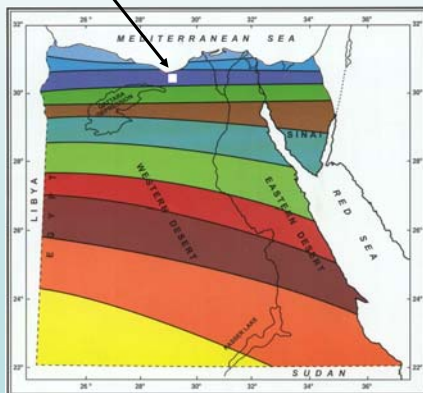


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Short term planning and Electricity export possibilities

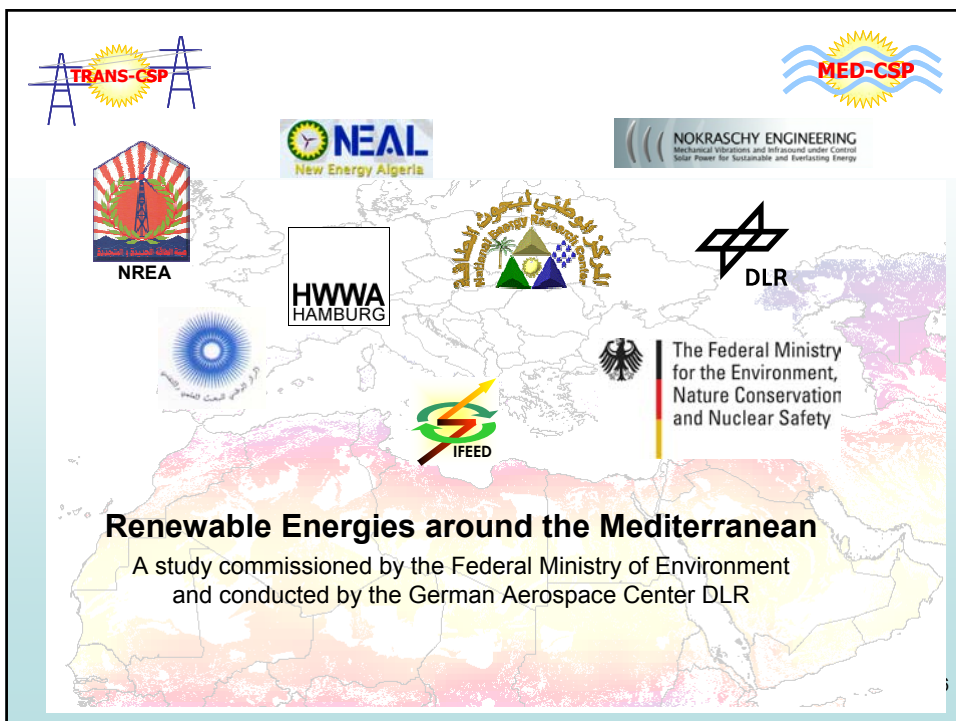
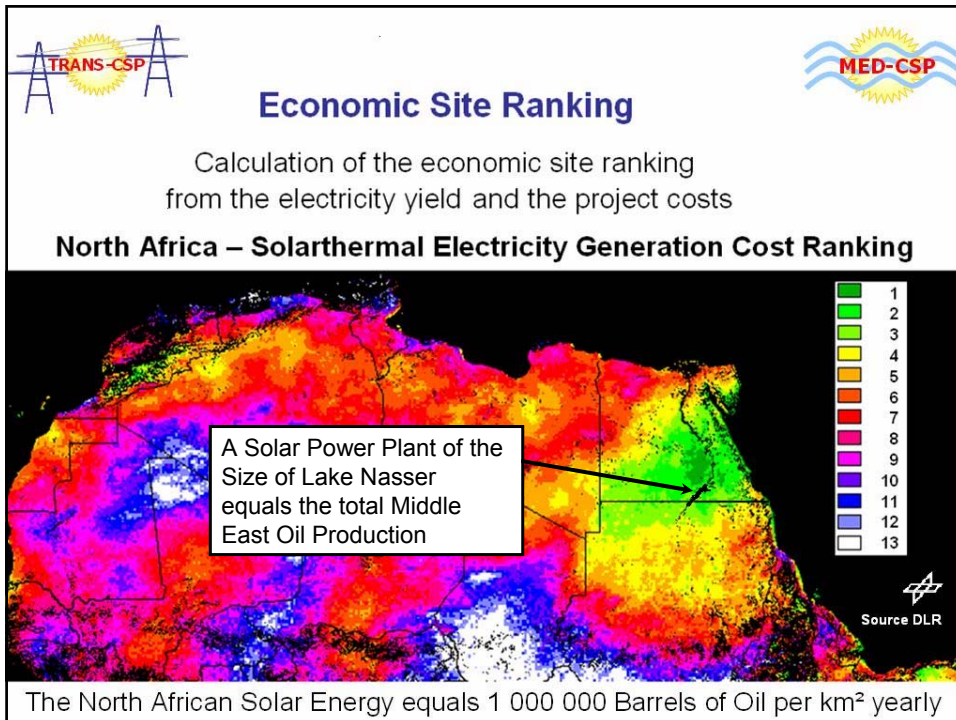
This Area 32x32 km = 1000 km²
gives 10% of Europe's electricity



Source NREA

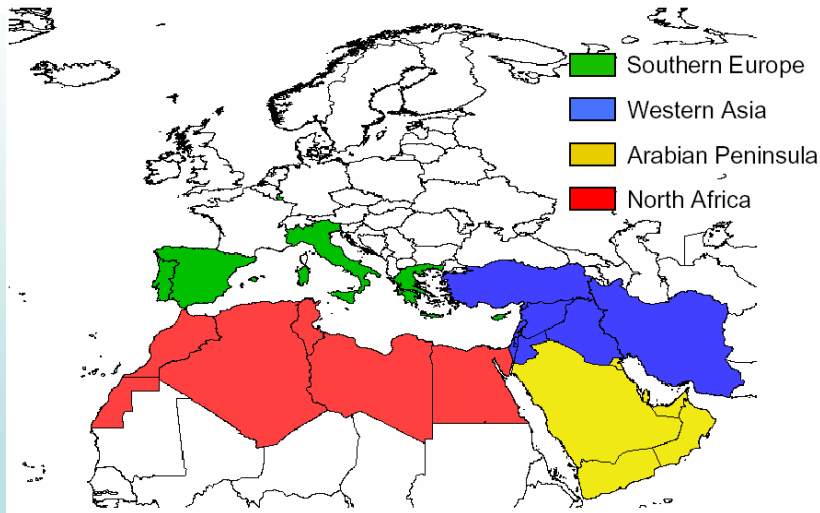


Source MoEE





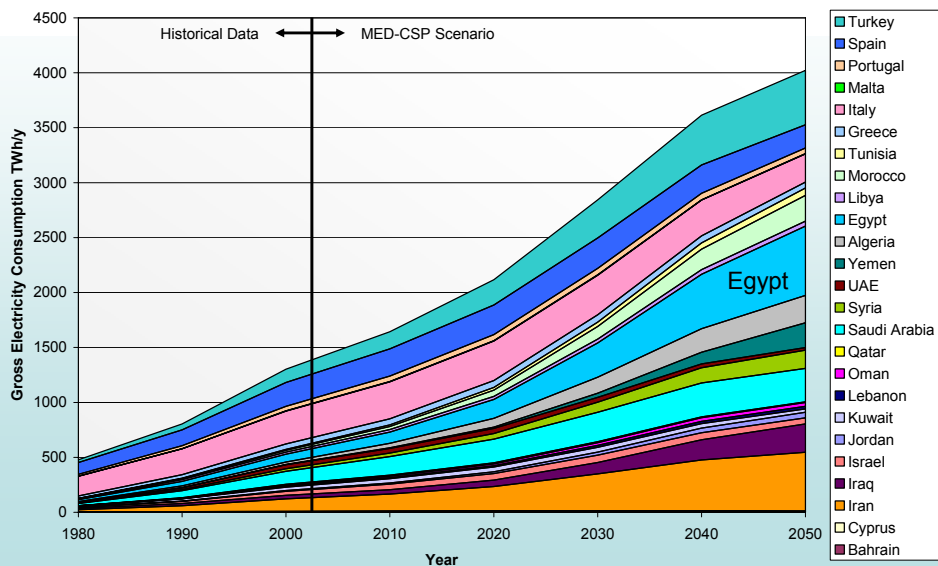
Countries analysed within the MED-CSP and TRANS-CSP Studies

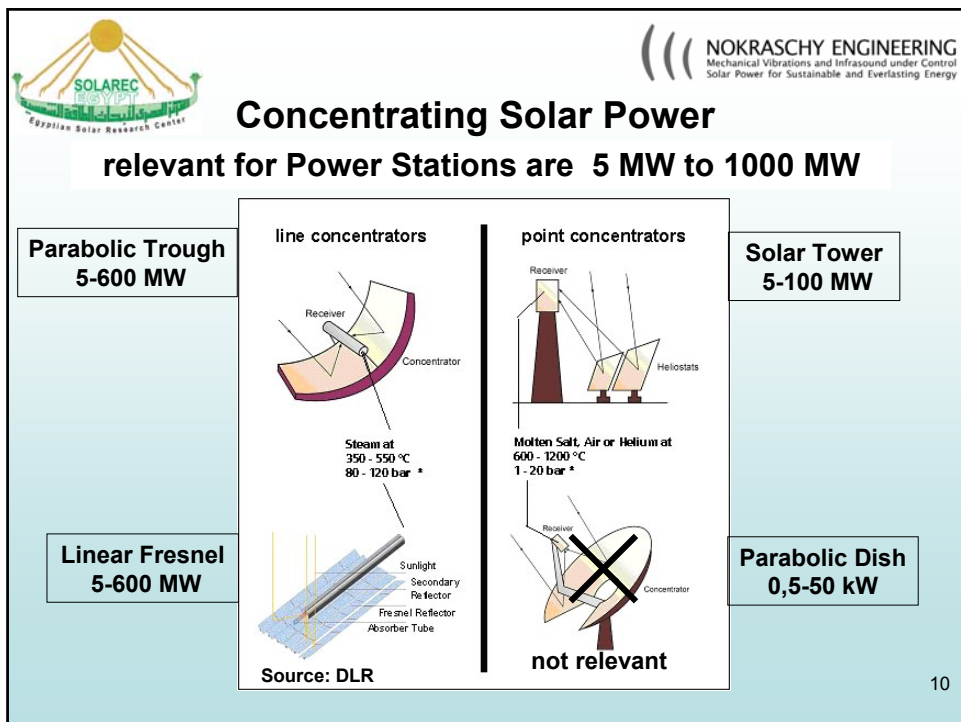
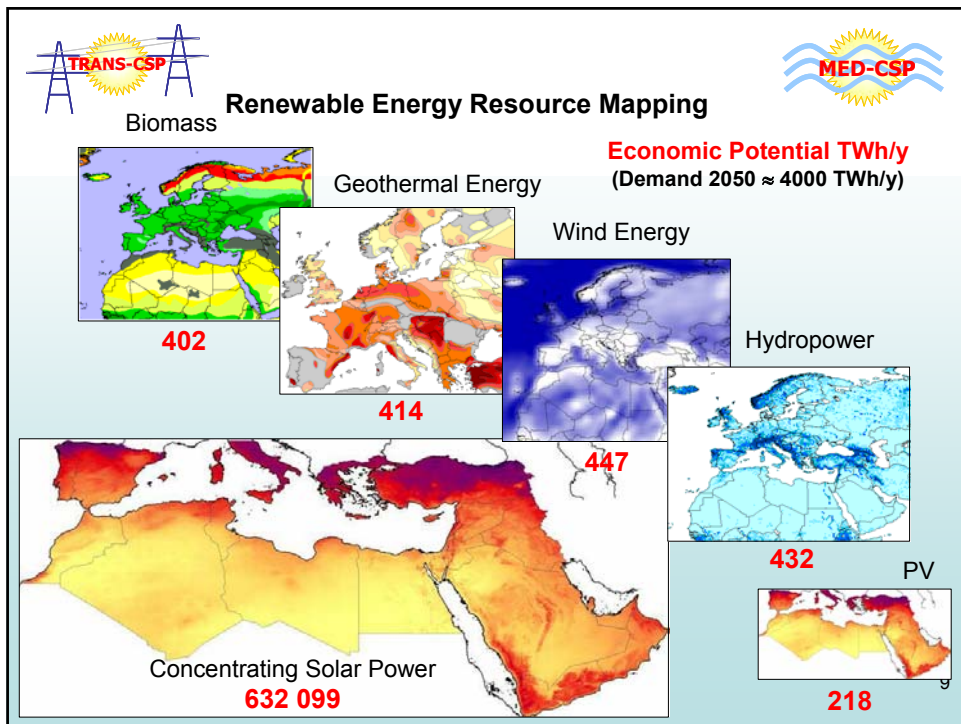


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Growing Electricity Demand in Southern EU-MENA





CONCENTRATING SOLAR POWER TECHNOLOGIES

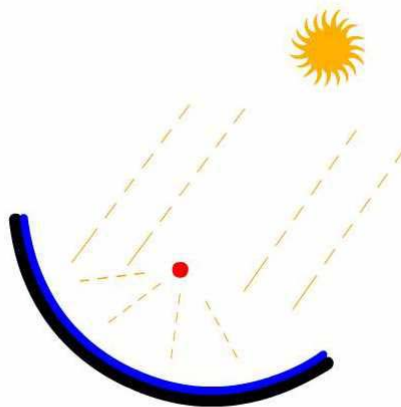
Linear Fresnel

Parabolic Trough



Central Receiver

Parabolic trough Technology



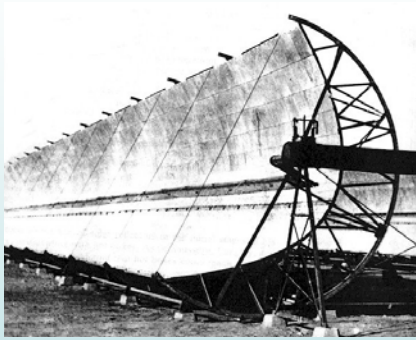
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Proven Technology of the past century

Following a German Patent from 1906



Frank Shuman
built in Maady 1912
the first CSP facility



He wrote: "One thing I am sure of; the human race should either utilize solar energy directly or go back to pre-civilization".

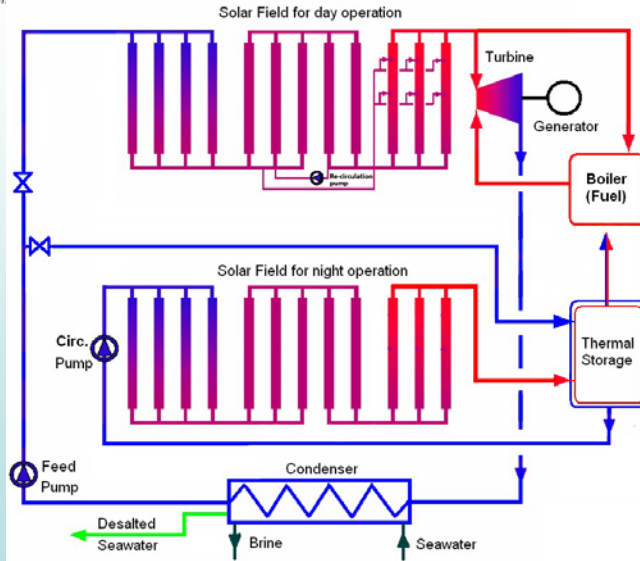
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CSP-Plant in California



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Solar Hybrid Power Station with Desalination



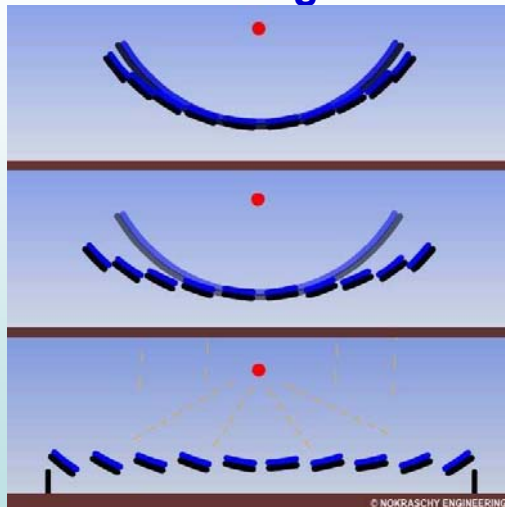
Step 1:
Solar field
in Hybrid
operation for
day and night
service.

Step 2:
Solar field
with Heat
Storage for Night
operation + fossil
boiler as reserve.

Desalination (MED) with Waste Heat

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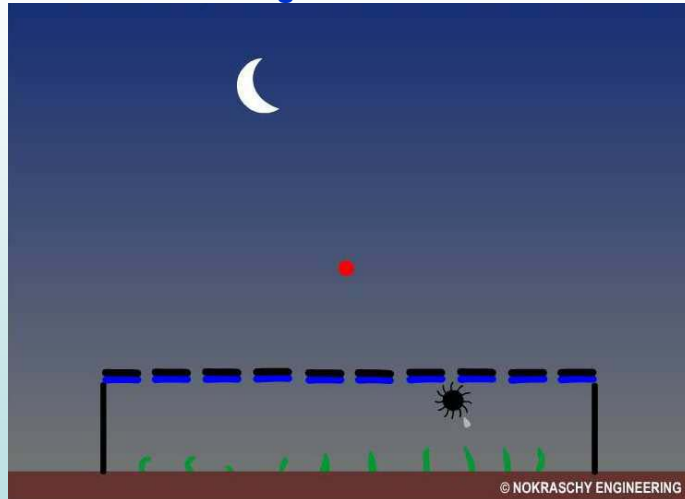
Advanced Design: Flat Mirrors



**Best collection of the Sunrays. Simple, cost effective
and usage of area underneath mirrors is possible**

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Automated Cleaning less cleaning water & it is not wasted



In the shadow plants need less irrigation water

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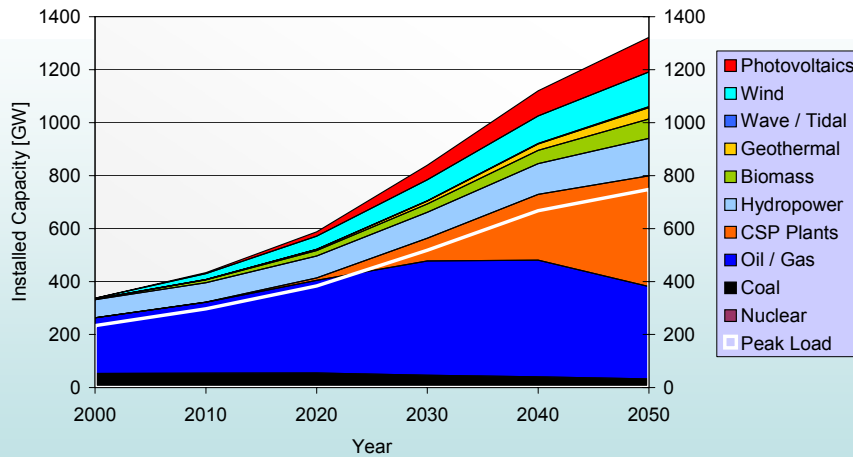
CSP in action



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Installed Capacity of Southern EU-MENA

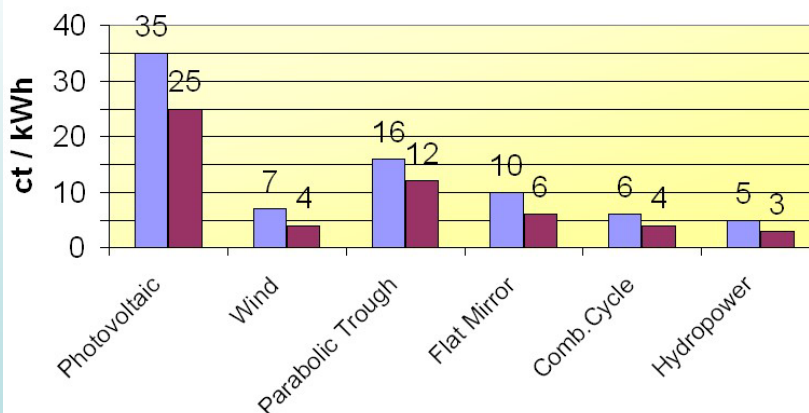


At any time, peak power demand is covered with an extra 25 % reserve capacity

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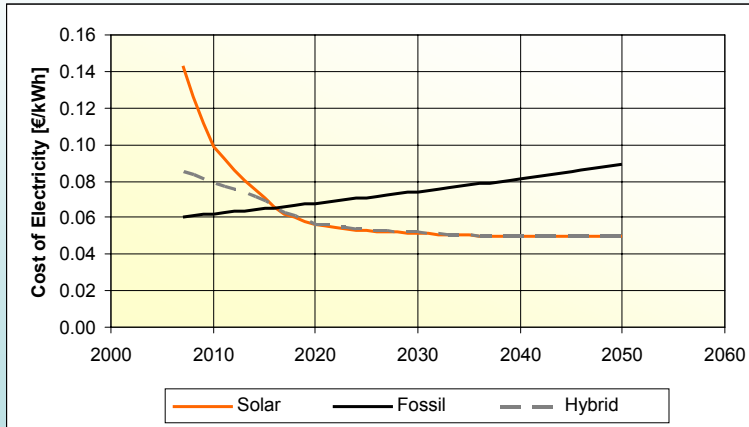


Electricity Production Costs in Egypt 2008



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Unsubsidised cost of electricity of CSP versus natural gas CC



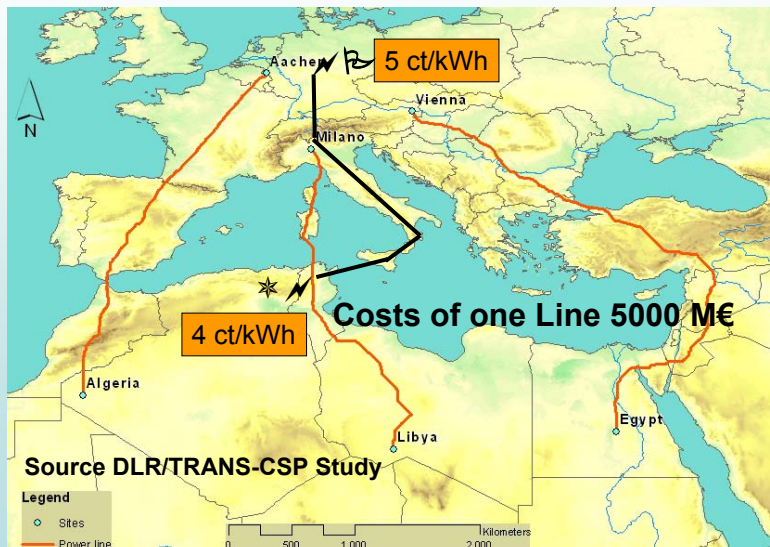
Discount rate 5%, economic life 25 years, fuel cost 25 €/MWh, fuel cost escalation 1 %/y, irradiance 2400 kWh/m²/y, real €2007, €/£=1

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Till 2050

The CSP in North Africa will cost 4 ct/kWh

3 Samples for EU-MENA HVDC Interconnection, transport cost 1 ct/kWh



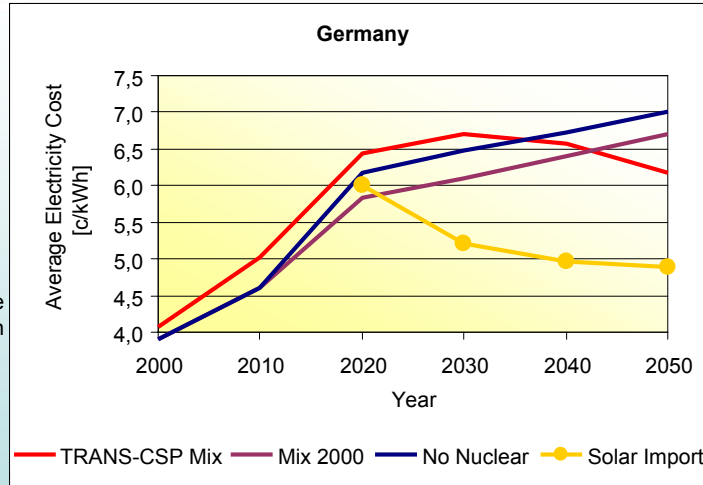
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Cost of Convent. Elect. Mix in 2050 about 7 ct/kWh in Germany

RUE
Rational Use of
Energy

RES
Renewable
Energy
Systems

CCS
Carbon Capture
& Sequestration



TRANS-CSP Mix: Energy Mix as described here incl. RUE, RES and CCS

Mix 2000: Maintaining exactly the Power Mix like in the Year 2000 with CCS

No Nuclear: Mix like in the Year 2000, but substituting Nuclear by Coal & CCS 23

A Ground breaking Idea

German Federal Minister of Environment:



Sigmar Gabriel

Studies on potential by the **German Aerospace Center** find that **solar thermal power plants** in southern Europe and northern Africa could play an important role in securing a sustainable European energy supply.....

The idea is ground-breaking: it means that in 20 to 30 years we can procure part of our energy from solar power plants in North Africa.one day, the European "**super grid**" will be able to transfer electricity produced in **solar thermal power plants** to central Europe – without any power cuts!

Writing a ground breaking Innovation born in Egypt



**Description of
contents**
ca. 3500 BC

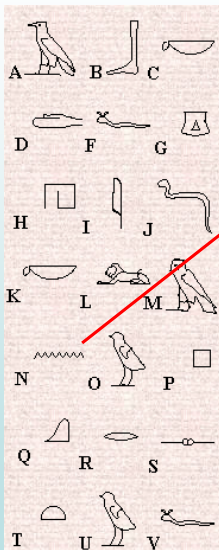


Source:
German Archeolog. Inst.

**Labels describing
contents**
ca. 3200 BC

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Writing



 = N

↓
**Water = MEM in
Semitic language**



➔ M

Source Egyptian Museum

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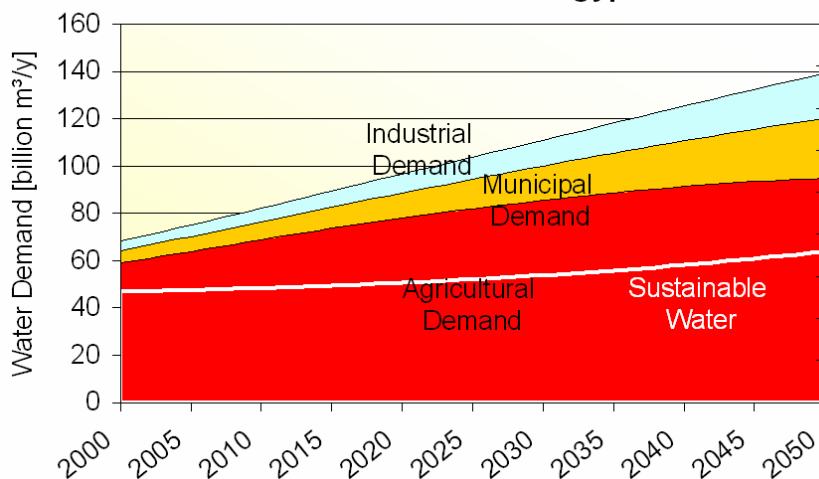
Let us return to the present

The Requirements in Egypt
are different than those of Europe...

- Not only Electricity is needed ...
... 6-8% increase yearly
- Water is also needed ...
... One more Nile by 2050

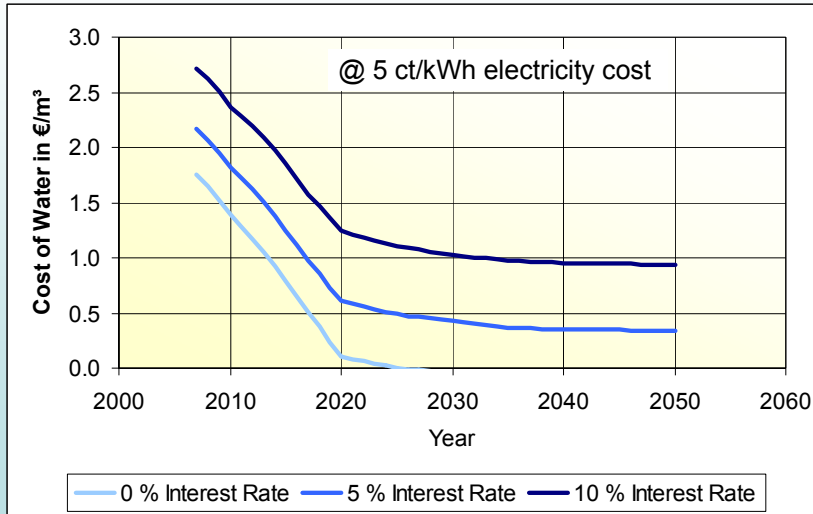
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Water Demand in Egypt



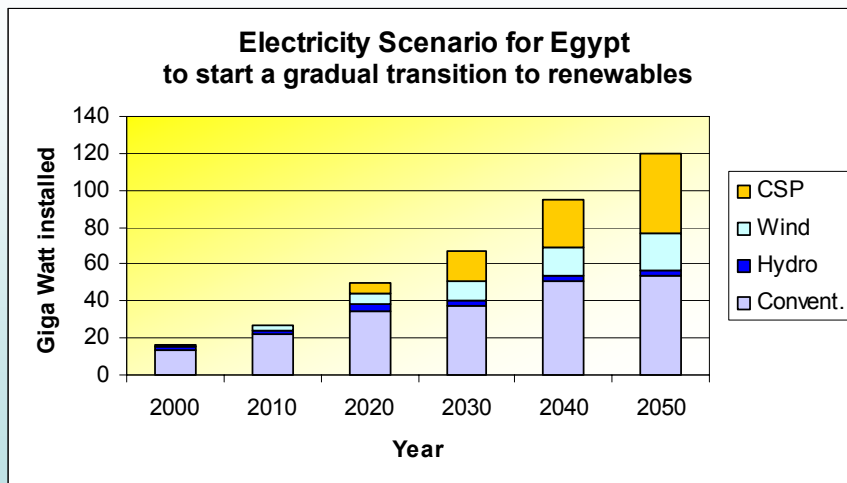
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CSP Desalination can be so cost effective



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Thank You



To down load the DLR-Studies: www.menarec.org

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