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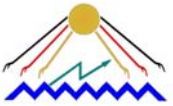

German Egyptian Year of Science & Technology

Symposium

Solar Thermal Power Plants and Desalination

Cairo, 11-12 November 2007

A Vision on the Future of Egypt in Benefit of Renewable Energies and Wise Subsidies

Hani El Nokraschy
www.nokraschy.net

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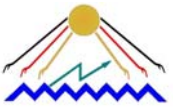

Unsubsidized

desalinated Seawater for Free?

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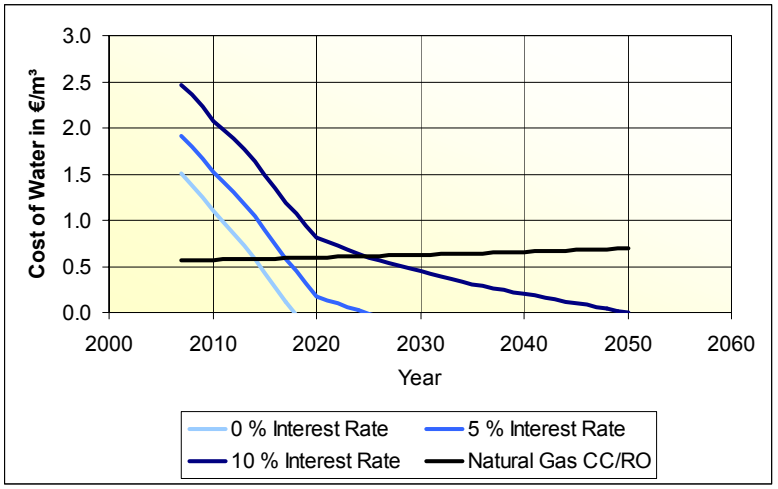
AQUA-CSP

Unsubsidised Cost of Water from CSP versus Natural Gas CC/RO



Discount rate 5%, economic life 25 years, fuel cost 25 €/MWh, escalation 1 %/y, irradiance 2400 kWh/m²/y, real €2007, RO power 4.5 kWh/m³

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Why Subsidies?

To support People with limited income

for how long?

Till their income raises and
they do not need support

Subsidy shall decrease with time

till it is Zero

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How to subsidize?

- Support a Product

  ➔ Subsidy increases with price of Product

- Support a Technology

  ➔ Subsidy decreases with develop of Technology

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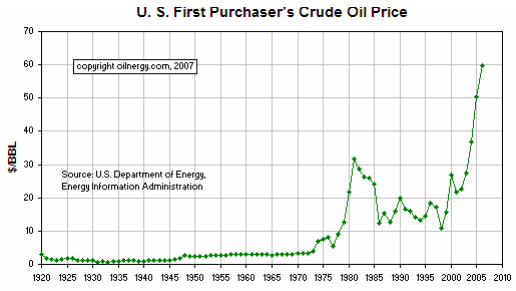
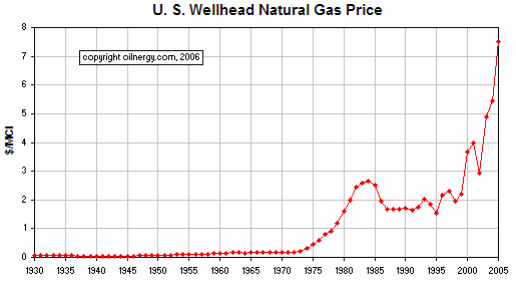


An Example from Egypt …

Subsidising Oil and Gas

President Mobarak said:

„Subsidies increasing from 1 Billion LE in 1998 to probably over 50 Billion LE in 2007“



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Example from Germany

Subsidising Coal

Winners:

- Employment of Miners
- Employment at Service Companies
- Industry of Mining Machines

Losers:

- Education (PISA Study)
- Innovation (Scientists leaving the country)

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An example for a ground breaking innovation

Description of contents

ca. 3500 BC

→

Labels describing contents

ca. 3200 BC

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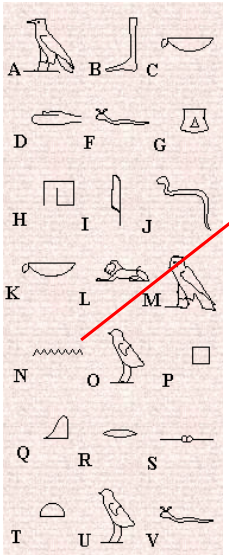
Writing



= N

Water = MEM in Semitic language

➔ M

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Another Ground breaking Idea

German Federal Minister of Environment:

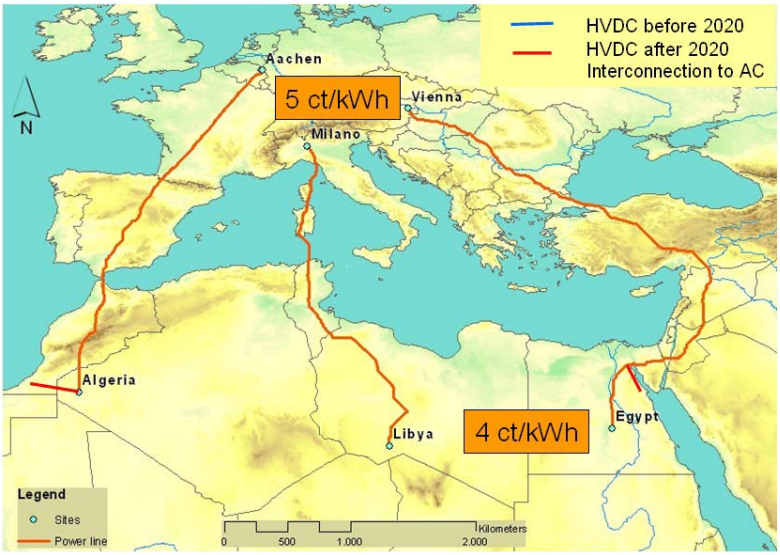
Sigmar Gabriel

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!

TRANS-CSP

MED-CSP

3 Samples for EU-MENA HVDC Interconnection including connections to wind sites in 2050



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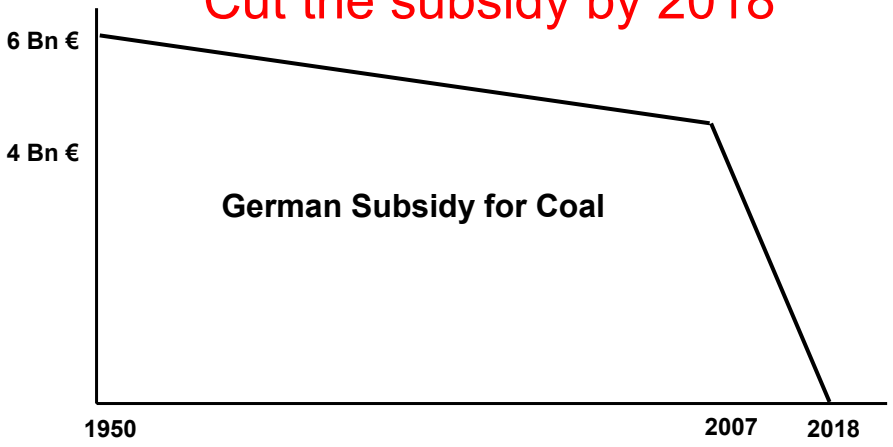
Decision of German Government: Cut the subsidy by 2018



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Subsidising a Technology …

- Technology will spread in the Market
- More Producers and more jobs
- Competion will cause prices to fall.

Result:
Subsidies are reduced automatically

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Example from Germany

- **More than 22 000 MW Wind Capacity operating in 2007**
- **240 000 New Jobs in Renewable Energy Technologies**

- **Price falling from 3600 €/kW to less than 1000 €/kW**

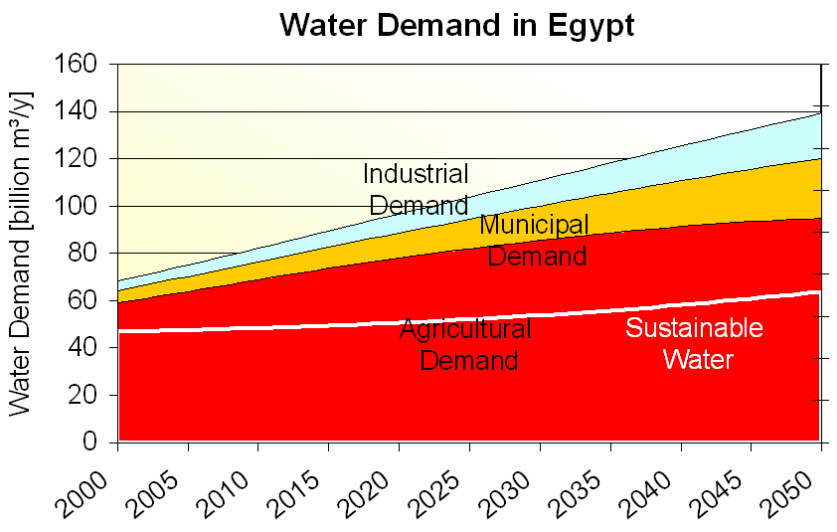
The Requirements in Egypt are different …

- Not only Electricity is needed

  (8% increase yearly)

- Water is also needed

  (A second Nile by 2050)



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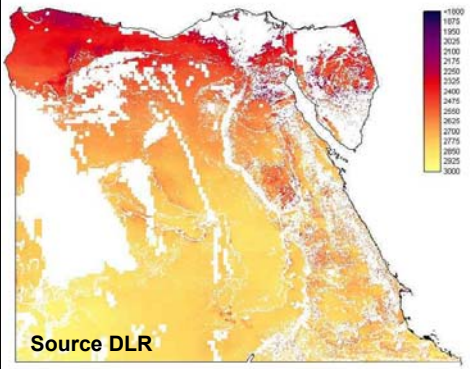
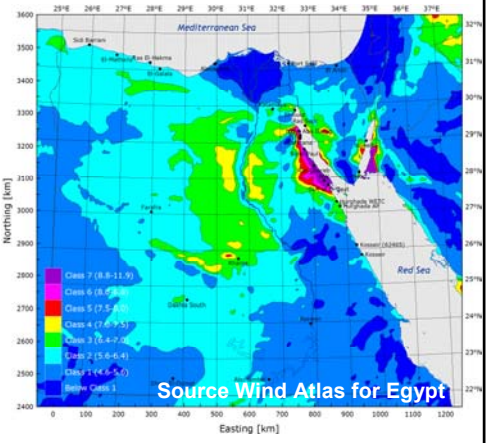
Egypt enjoys excelent Renewable Energy Sources



Direct Normal Irradiance
up to 3200 kWh/m²/year



Wind speed up to 12 m/sec

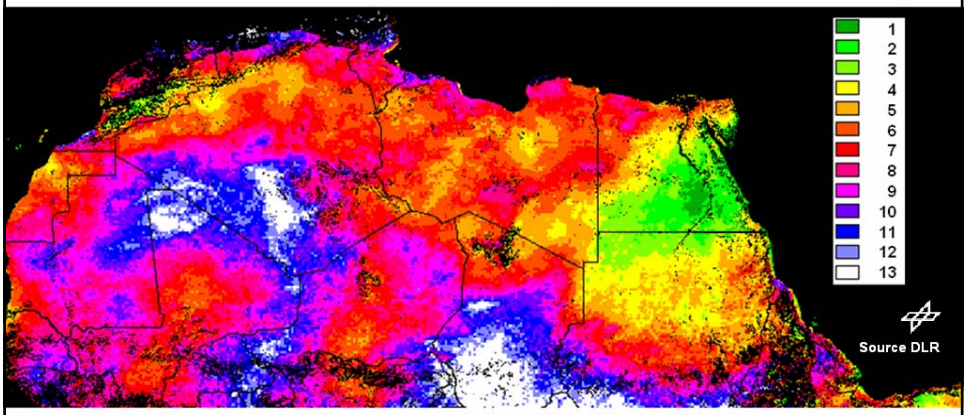
TRANS-CSP

MED-CSP

Economic Site Ranking

Calculation of the economic site ranking
from the electricity yield and the project costs

North Africa – Solarthermal Electricity Generation Cost Ranking



The North African Solar Energy equals 1 000 000 Barrels of Oil per km² yearly

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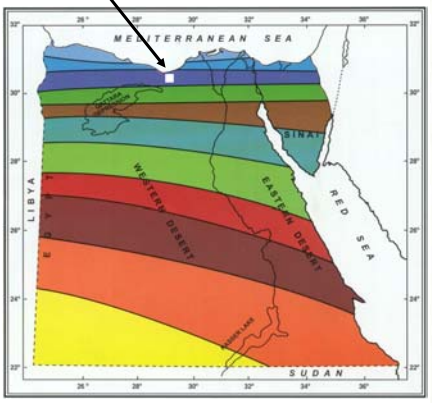
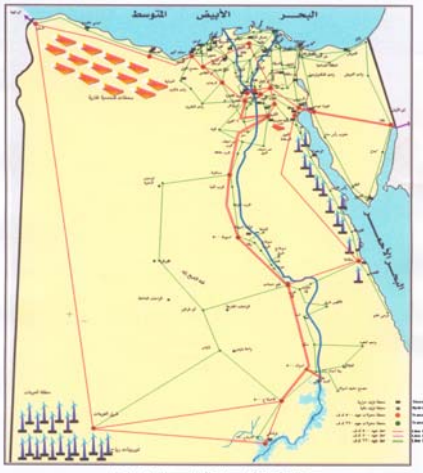
Short term planning and Electricity export possibilities

This Area 32x32 km = 1000 km² gives 50% of Germany's electricity



Source NREA



Source MoEE

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CSP TECHNOLOGY

Size: 5 MW - several 100 MW

Linear Fresnel

Parabolic Trogh

Central Receiver

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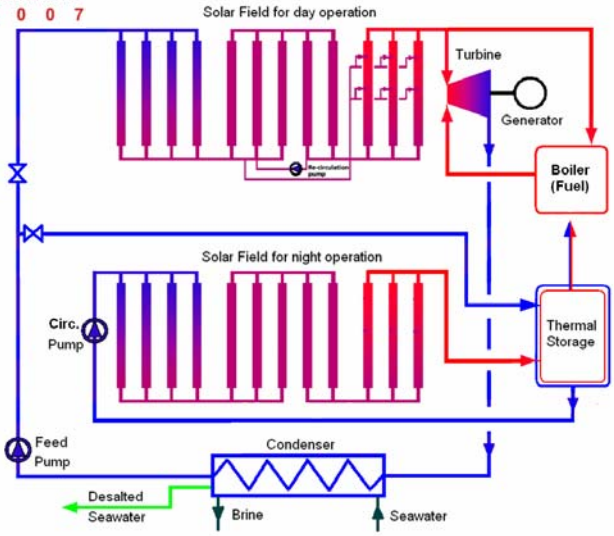
Hybrid Solar Power Station combined with Desalination



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

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

Desalination (MED) with Waste Heat

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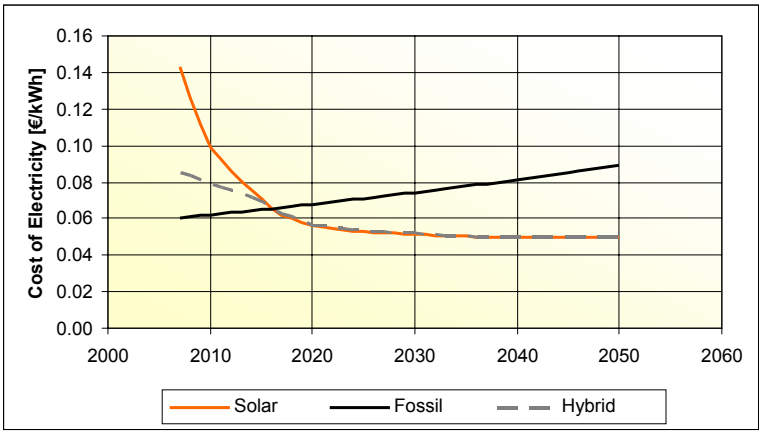
AQUA-CSP

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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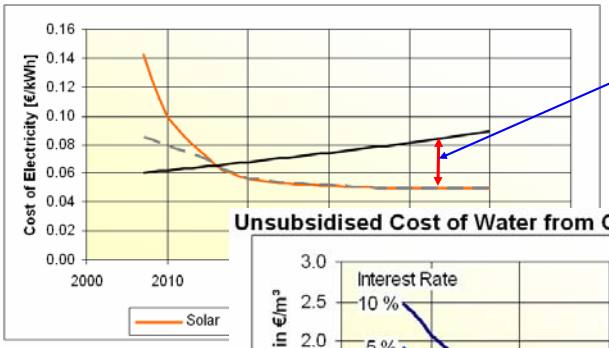
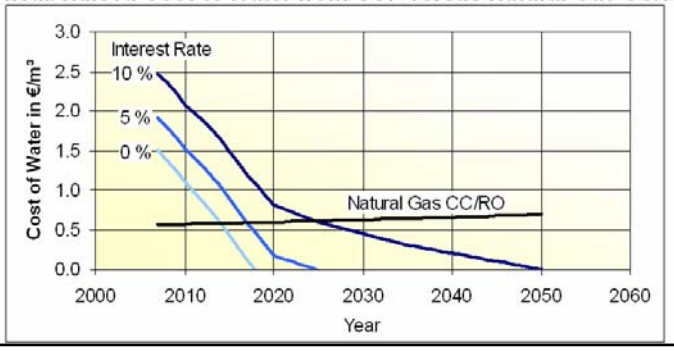
Unsubsidised cost of electricity of CSP versus natural gas CC



This diffirence is used to support water desalination

Unsubsidised Cost of Water from CSP versus Natural Gas CC/RO



Cost of water from CSP/MED plants. Please note that before 2020 water could be produced as bye-product without cost

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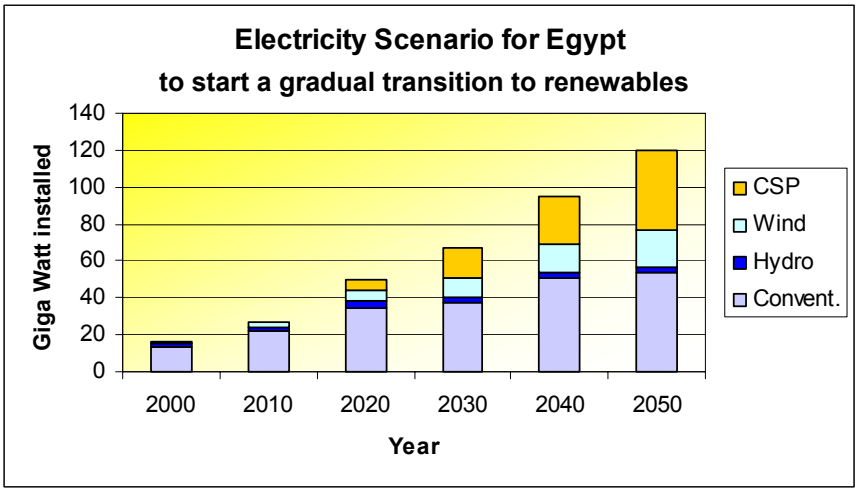
Thank you for your attention



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