

‘Keeping the lights on - UK and globally’

Presentation by

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Friends of the Earth

Claverton, April 2008

- CCS

- CHP

- CSP

CCS demo in UK - 2 - 3 GW by 2015 (20 TWh/year)

- * post combustion 1 - 2 x 300 MW scrubbers
- pre combustion 2 - 3 at 800 MW gasifiers
- 2 or 3 CO2 pipelines - Tees, Humber, Thames
- UK well placed to demonstrate - as part of global demo

Secretary of State John Hutton :

* 'Over the next two decades just to maintain our existing capacity, we [the UK] will need to develop approx 30 – 35 GW of new electricity generation capacity to power UK homes and business. Around two thirds of that capacity will need to be available by 2020.'

* 15% RE 'share' by 2020 = 300 TWh/year

* 40+ % RE electricity = 160+TWh/y or 23 GW at 80% LF

* by 2016 say 70 TWh/year (~10 GW at 80% LF)

‘new generating capability by 2016 (retained CCGTs):

- need ~**18 GW** new capacity (25% of UK) by 2016
- renewables 10 GW_{av} + 6 GW_e CHP ~ **16 GW+**
- 5 GW consented CCGTs + CCS demos ~ **7 GW+**
- no need for FIRST new nuclear station in 2018 ?

‘Keeping the Lights On’

- between 2017 - 2027 another 16 GW needed
- 11 GW new ‘replacement’ nuclear programme

BUT

- renewables + efficiency + CHP / CCS ~ 10 GW (or more)
- the gap is before 2017
- so nuclear is NOT needed ‘to keep the lights on’

A Non Nuclear Powered Wales

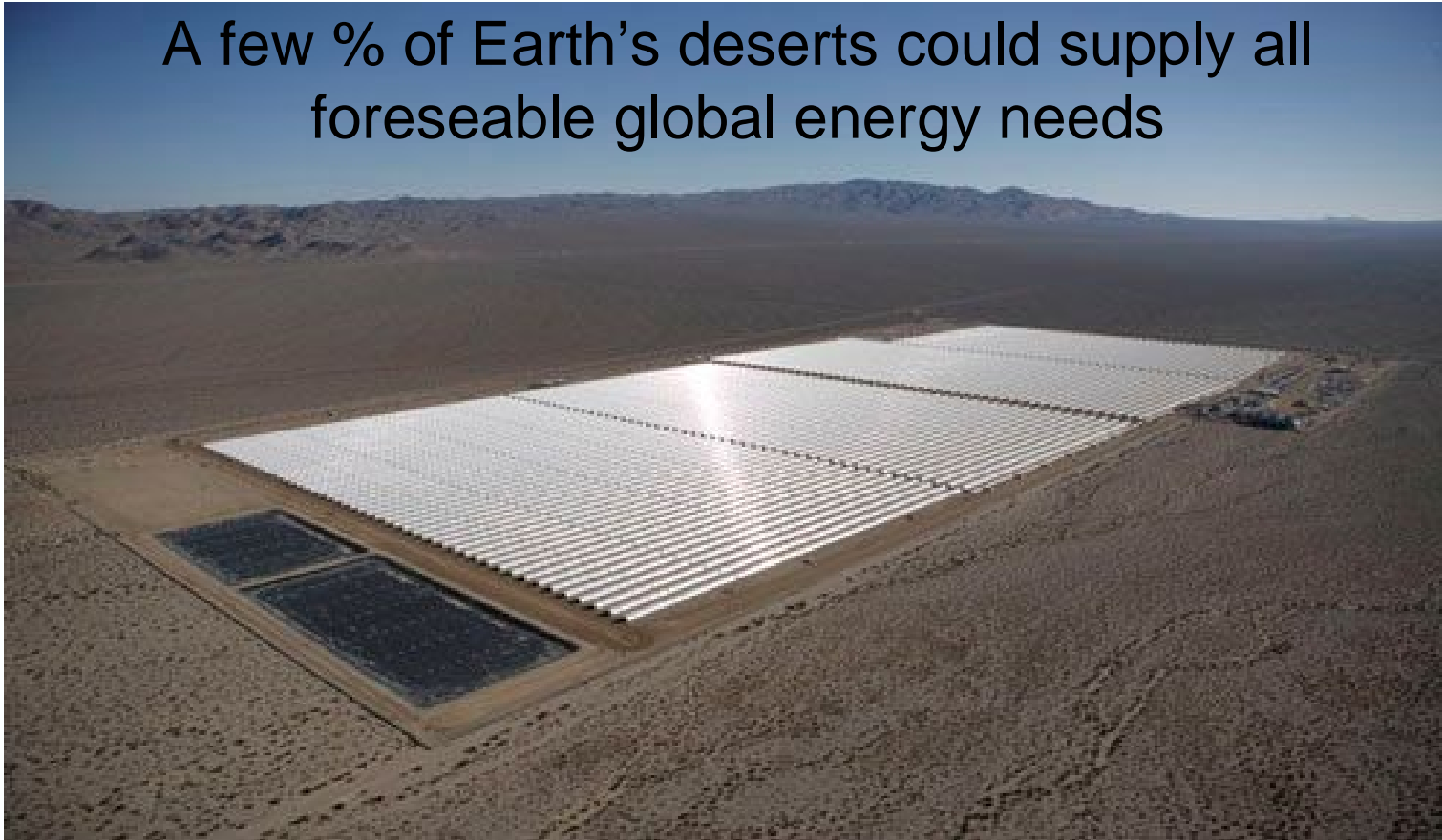
- nuclear power ~ 20% of UK electricity in 2004
- nuclear power ~ 3.8% of UK energy in 2004
- nuclear power ~ 3.0% of global energy in 2007
- global energy demand could double by 2050 so nuclear share 1.7% (marginal contribution)

- global final energy in 2007 = 90,000 TWh/year
- global final energy in 2030 = 130,000 TWh/year
- UK per capita (2,000 TWh/y) = 33 MWh/year
- global pop 9 billion at 50 % UK = 150,000 TWh/year
- at 90 % UK = 270,000 TWh/year

- even IF nuclear output increased to say 3,000 TWh/year from 400 GW of reactor capacity it would only contribute 1.7% of 2050 global energy consumption for say 100 years (assuming 2050 consumption to be 180,000 TWh/year).
- 'fast' breeder technology has so far failed badly (ie unproven) and would only scale up slowly anyway
 - there is enough plutonium for 80 GW globally in 2030, which would only breed 160 GW of new fuel by 2070 ish, and 320 GW about 40 years later - beyond 2100.

Concentrating Solar Power (CSP)

A few % of Earth's deserts could supply all
foreseable global energy needs



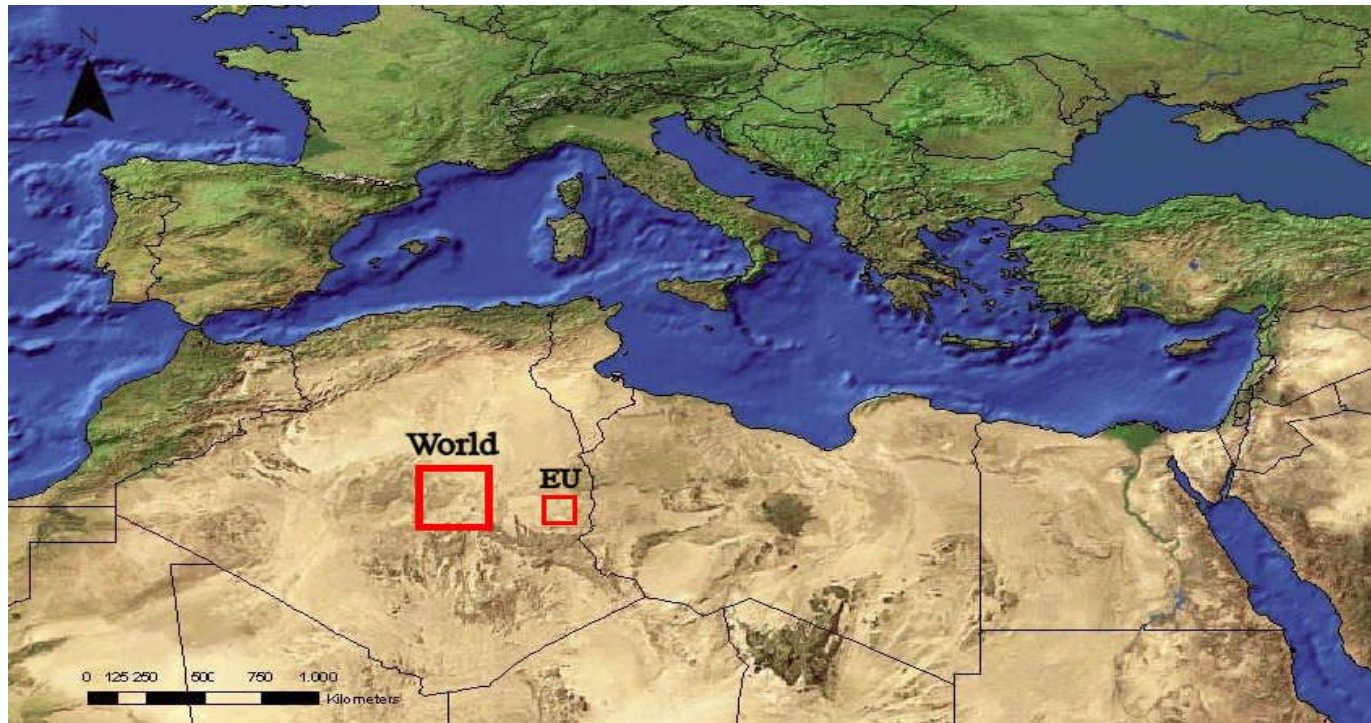
- two thirds by CSP ? (100,000) = 200,000 sq miles
- CSP area equivalent to 450 miles by 450 miles
- Earth desert area less than 2% for 100,000 TWh/year
- 'peak solar' in 500 million years
- massive sea water desalination
- synthetic hydrocarbon (potentially) - with CCS ?

CSP scheme in Mohave desert, California



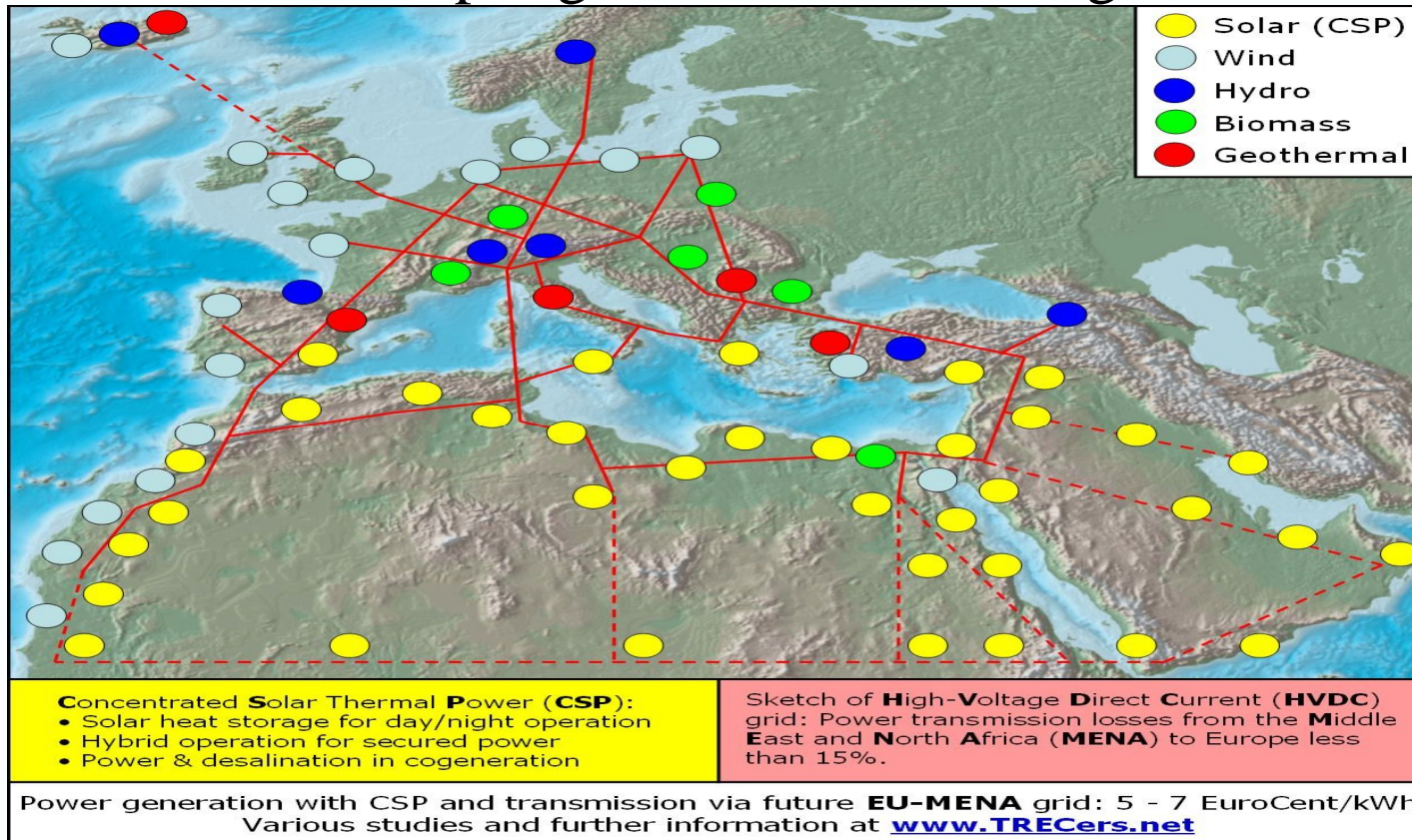
‘Keeping the Lights On’

Concentrating Solar Power, CSP - an ample supply



'Keeping the Lights On'

A EU super-grid and wider solar grid



CHP - piped-heat

- 20,000 11 kV sub-stations / 10,000 + gas sites ?
- National Grid - 55,000 miles of (iron - plastic) gas-pipe replacement programme at £ 250 million /year
- NG owns about 66% of gas grid
- kerb route (16 inches deep, 12 wide)
- new electric / broadband cables

UK primary energy : 2,900 TWh/year

UK final energy consumption : 2,000 TWh/year

UK electricity : 400 TWh/year

Nuclear : 80 TWh/year

Offshore wind (33GW by 2020) 100 TWh/year

- Severn barrage
- 17 TWh/year : 4.3% of UK electricity / 1% UK final energy
- tidal lagoons : possibly 1 ~ 5% ? UK electricity
- lagoons - enhanced output / 24 hr dispatch / storage

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- Tyndall Centre - early CO₂ reductions are the most valuable
- aerogenerator 5 - 20 MW offshore windturbine
- Carbon-neutral ‘synthetic’ hydrocarbons - methanol (produced by CO₂ adsorbed from air + 2H₂ from desalinated sea water/electrolysis + energy from CSP) - no need for HVDC
- 1 sq mile of CSP ~ 100 sq miles + of fastest growing biomass (jatropha) fired in CHP

arid/semi-arid areas + terra preta fertilizer
(low temp charcoal) + trace minerals (from quarries)
+ desalinated water (from CSP) =

greening of desert areas =

more food and water for drinking (for 9 billion people)