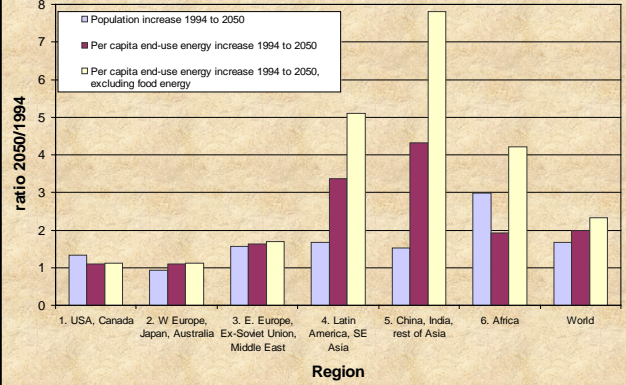


The role of renewable energy in short and long term



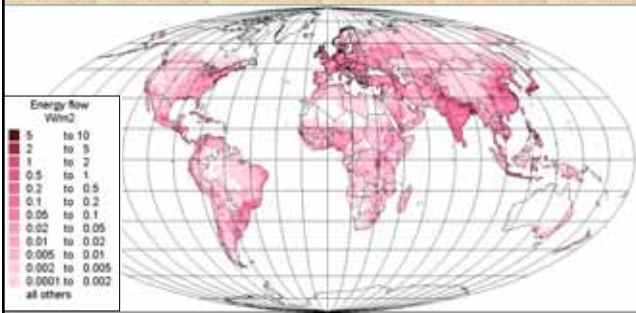
Bent Sørensen, Roskilde University, Denmark

A 2050 global end-use energy scenario



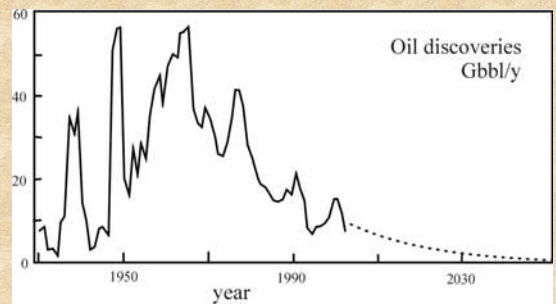
A scenario assuming global solidarity and no major wars....

SCENARIO 2050 END-USE ENERGY CONSUMPTION (INCLUDING FOOD ENERGY AND ENVIRONMENTAL HEAT, W/m²)

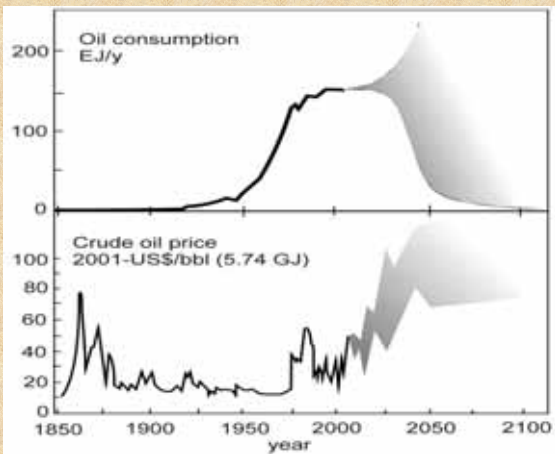


This and following figures are based upon monthly calculations for a typical year. Hourly simulations have been performed for Denmark.

Why are alternative fuels urgently needed?



If not oil, then what?



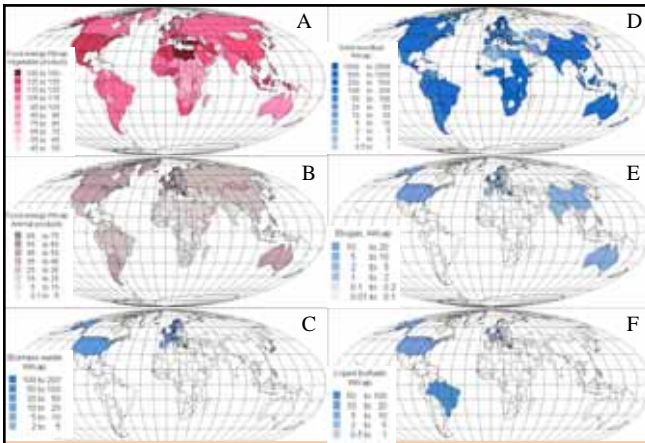
Safe fission reactors takes 25-50 years to develop, safe fusion reactors 50+ years.

Clean coal and natural gas technologies take some 10 years to develop and another 10 to introduce on a large scale. Cost is typically 2+ times current energy cost. Resource sufficiency unclear with environmental concerns.

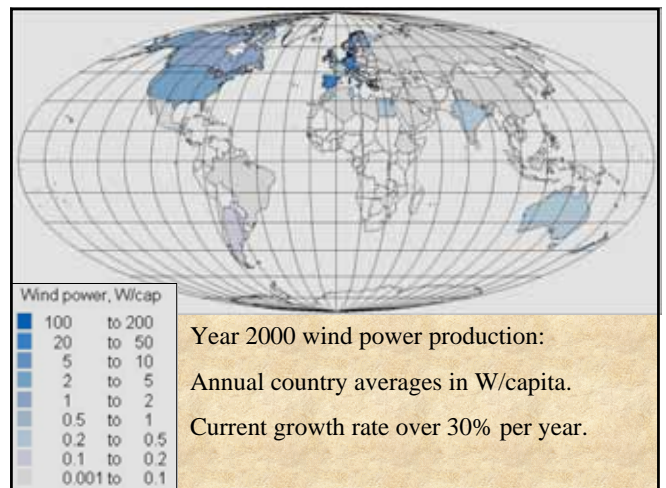
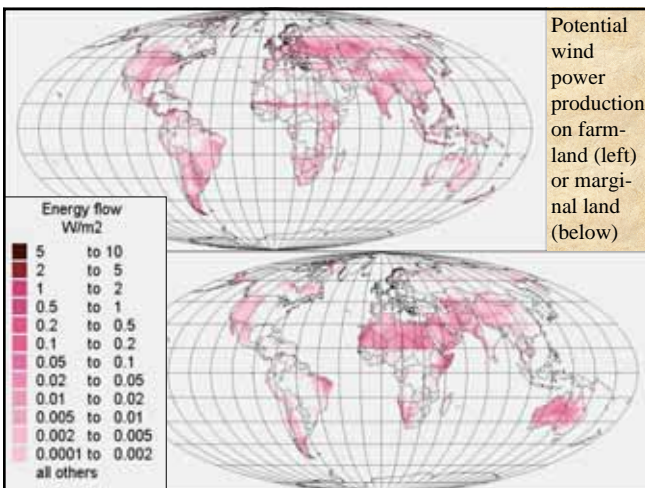
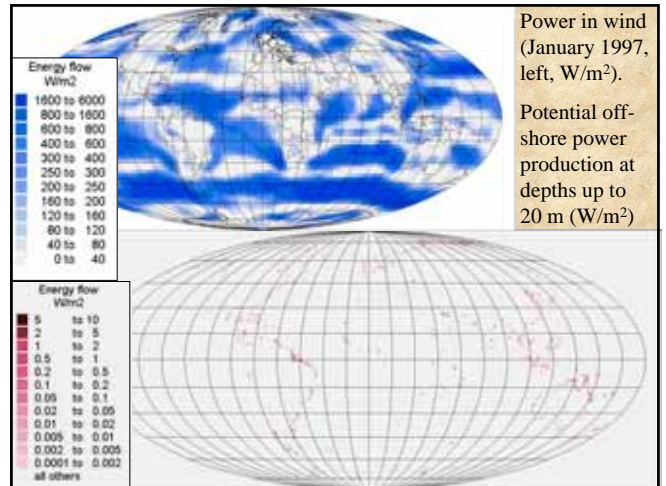
Renewable energy: many technologies are ready. Wind and solar hot water are cost-effective in many places. Solar heating needs seasonal storage, as do solar cells (plus substantial price reduction). Biofuels are currently some 2 times current fuel costs. Resources are sufficient.

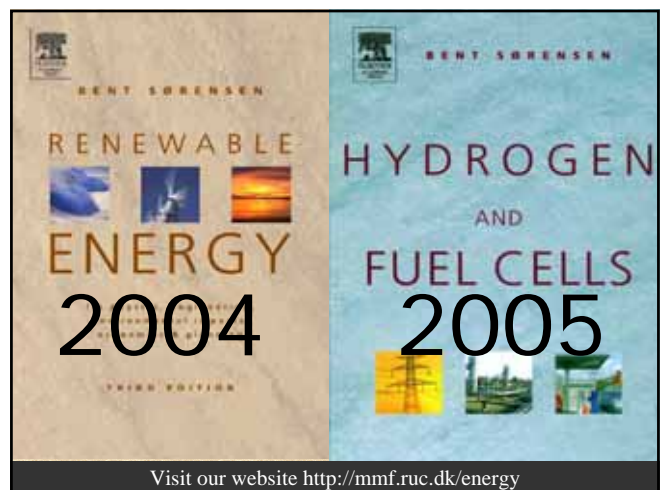
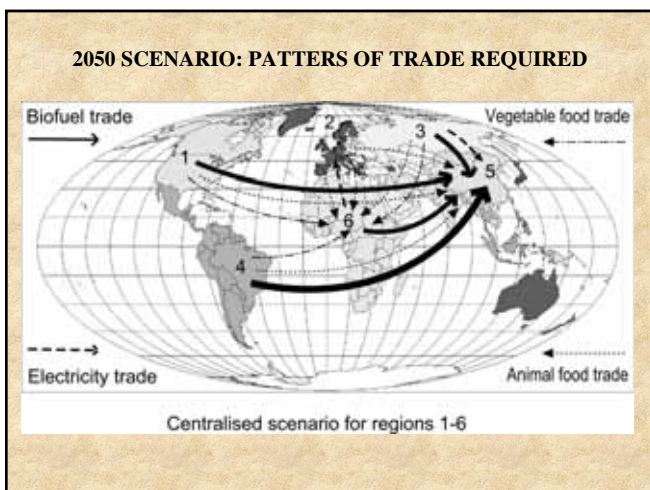
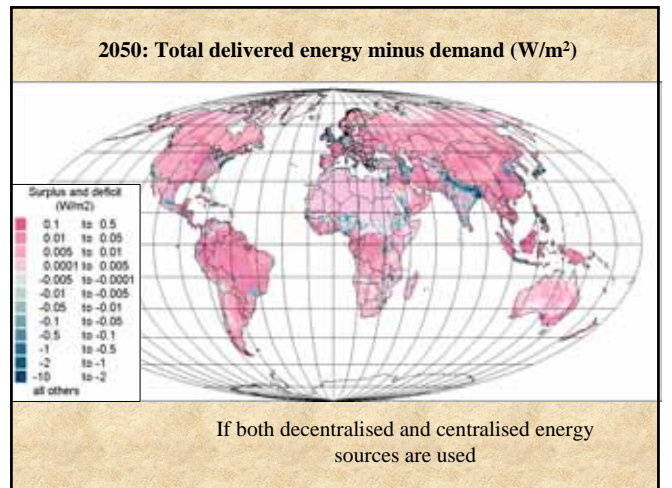
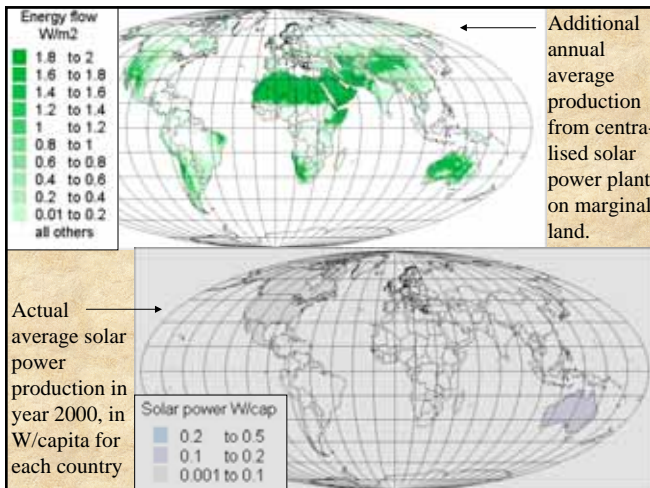
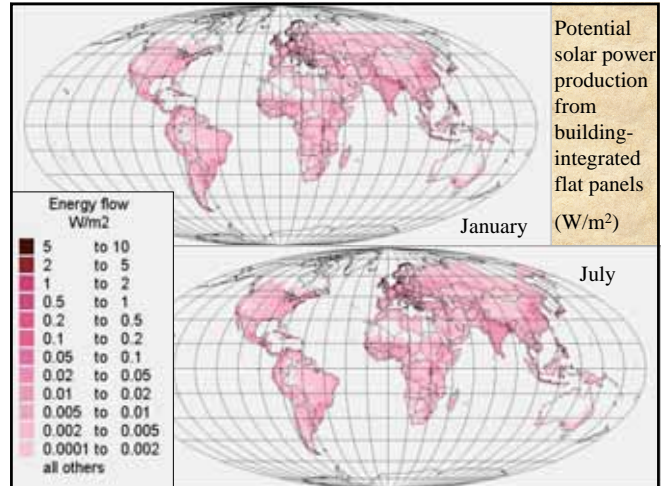
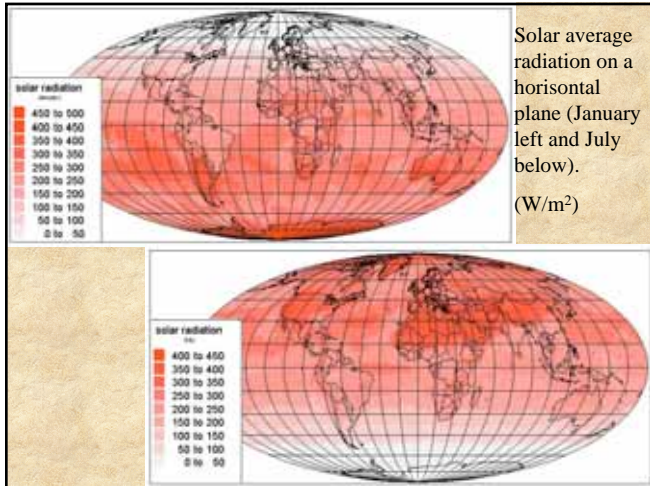
Hydrogen is a possible intermediary fuel. Fuel cells need 10-15 years of development and substantial price reduction.

POTENTIAL ANNUAL BIOMASS PRODUCTION (W/m²)
Mature ecosystem: Woods Hole Model (Melillo et al.)



2000 biomass use (W/cap). A: vegetable food. B: animal products. C: Power/heat from waste. D: Woodfuel. E: Biogas. F: Liquid biofuels (presently ethanol and biodiesel).







Thank you for
listening.....