A sustainable energy supply for everyone

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There is no energy crises

- Energy efficiency world wide is about 2%
- The sun gives us in one hour more energy than the world consumes in a year
- Renewable energy is everywhere but dispersed

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Solar doorbell

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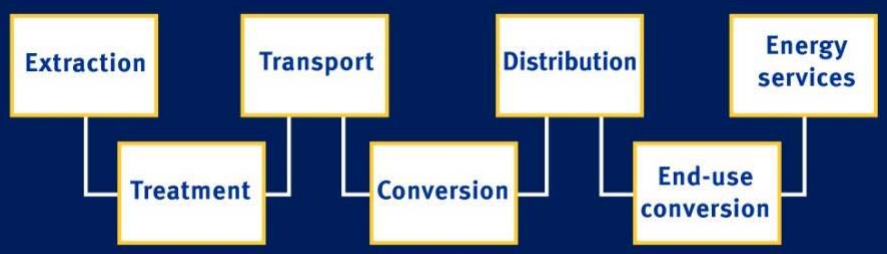
Cooking a potato

Flows of solar energy

Solar radiation intercepted by the earth	5.450.000 EJ/yr
Solar radiation reflected by the earth	1.640.000 EJ/yr
Solar energy involved in direct heating	2.550.000 EJ/yr
Solar energy involved in evaporation	1.260.000 EJ/yr
Solar energy utilized in photosynthesis	3.150 EJ/yr
World wide energy use 2007	500 EJ/yr

Traditional energy chain
From source to service



Sources <--> Technologies <--> Currencies <--> Technologies <--> Services

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The sustainable energy chain

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Our buildings

- Energy use for heating and cooling our buildings is roughly 25% of all energy.
- But why do we use energy in our buildings?
  - In winter time it is too cold and we have to heat our buildings
  - In summer time it is too hot and we have to cool our buildings
- It is not an energy problem it is a storage problem

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The Closed Greenhouse

Total control of temperature, humidity and CO_2 levels in a greenhouse

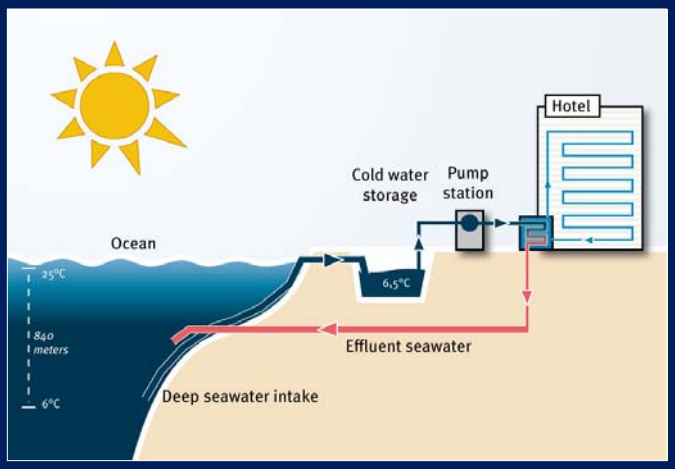
Advantages:

- Produce, not consume, energy
- re-use of irrigation water 90%
- reduced use of pesticides 90%
- increased crop production 25%
- improved process control

Cooling buildings

- Around the equator we need to cool our buildings the whole year.
- 50% of all electricity in these area's is used for cooling (air conditioning).
- But why do we produce from electricity cold water if there is a cold water resource available in the ocean?

Sea Water Air Conditioning



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Offshore sustainable energy

- There is more space offshore than onshore, 70% of the world is offshore
- There are more and better renewable energy sources offshore than onshore.
  - The winds are stronger
  - Algae's produce 5-10 times as much biomass than onshore crops
  - We have also waves and tidal energy and some others

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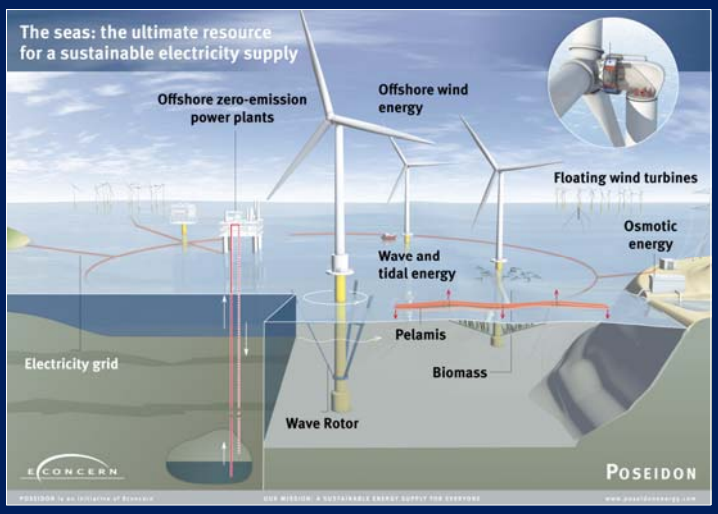
Wind energy at North Sea

Area	30.000 km² (5.8% North Sea)
Wind	300.000 MW
Electricity Production	1.100 TWh

6% of North Sea area could provide the electricity for all North Sea countries

Poseidon



State of the world

In today's world of 6,7 billion people:

- 4 billion people live on 2 dollars or less a day
- 2 billion people have no electricity grid connection
- 1,6 billion people are illiterate
- 5,9 billion people do not have access to the internet!

Triple Sustainability

- Sustainable Energy
- Sustainable Business
- Sustainable Education

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NICE Center

- Education
- Multimedia Internet services
- Mini-cinema
  - –Education
  - –Information
  - –Movies / TV
  - –Football
- Printing and scanning

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