

## Global Challenges

**Sustainable  
Water and Energy  
Resources  
-impact in cities (Lisboa)**

Erik Christiansen, EBO Consult Ltd.  
Lisboa November 2006



## EC - sustainability

Managing Director – EBO Consult  
Chairman of the largest Wind Co-op in  
Denmark (DK)  
Chairman of the first PV-Co-op in DK  
Chairman of European Green Cities DK



## Water Scarcity

70 % of the planet Earth  
97,24 % sea water (salt)  
Water in ice/snow  
Water in the underground  
*Less than 1 % is available for  
creatures who need water  
(human beings and animals)*



## Water Scarcity

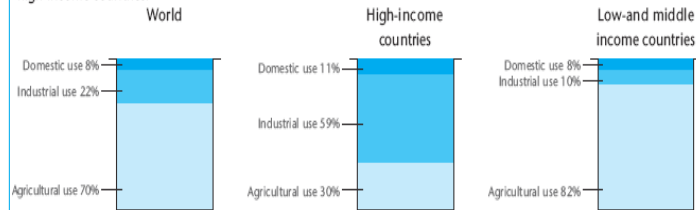
Available water is to a great extent  
economically unavailable:  
Amazonas Bassin (transportation)  
Monsoon areas (storage)  
Same amount of water for the past  
10 mio. years  
Challenges: more people  
and climate changes!



Who  
USES fresh water?

Competing water uses for main income groups of countries<sup>6</sup>

Industrial use of water increases with country income, going from 10% for low- and middle- income countries to 59% for high-income countries.



Ref. 6: "Water for People, Water for Life" United Nations World Water Development Report, UNESCO, 2003  
www.unesdoc.unesco.org

# People & Water Consumption

6,3 billion (now)

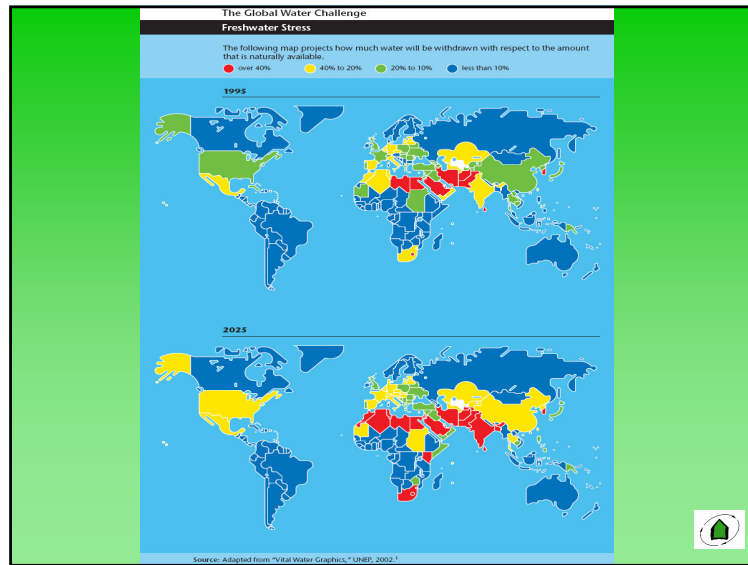
9,3 billion (2050)

Challenge: to be better managers and distributors of available water!

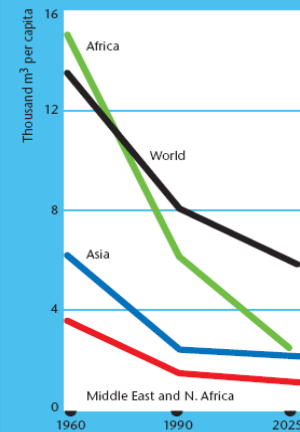
In the 20th century:

Population tripled

Water consumption six-doubled

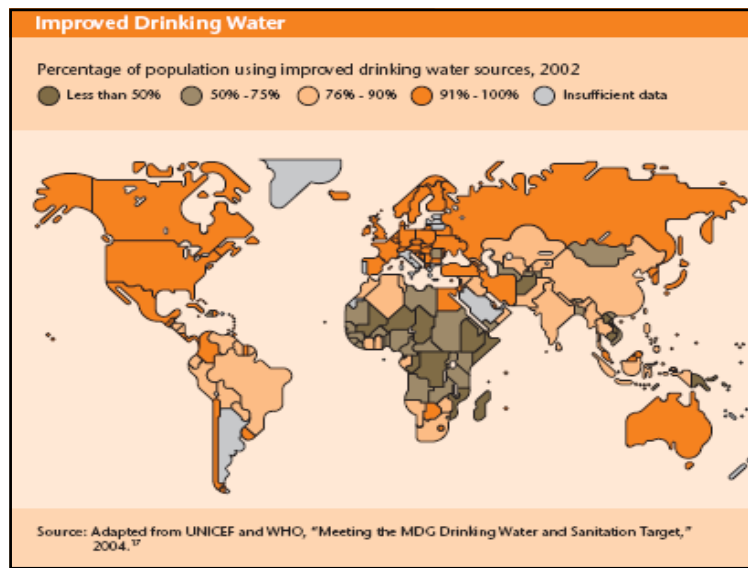
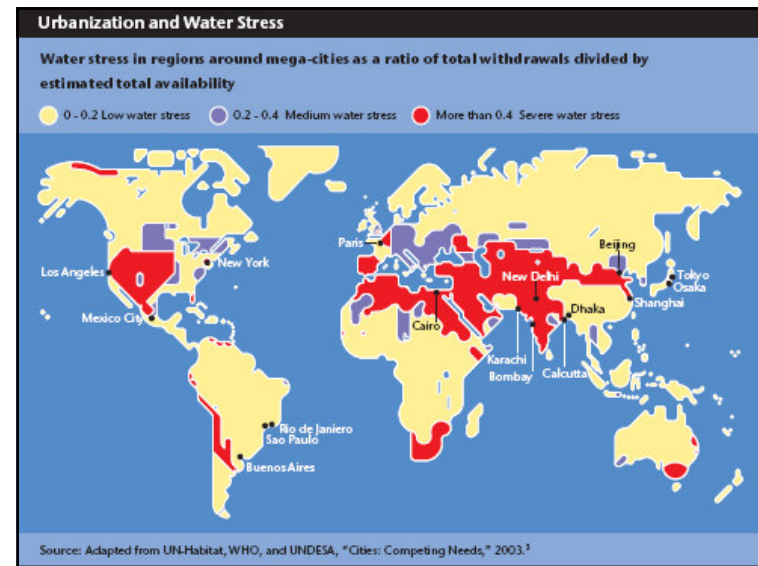
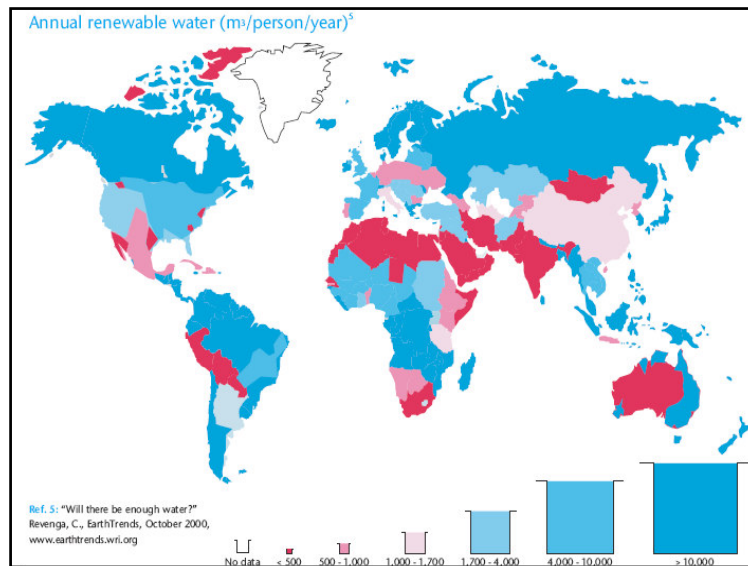


## Per Capita Water Availability



Source: Adapted from Grey and Sadoff, "The Global Water Challenge," 2006.<sup>2</sup>





In 2000 scientists estimated that in 2015  
 1/3 of the World's population would  
 experience water scarcity.  
 In 2006 the estimation is fulfilled!

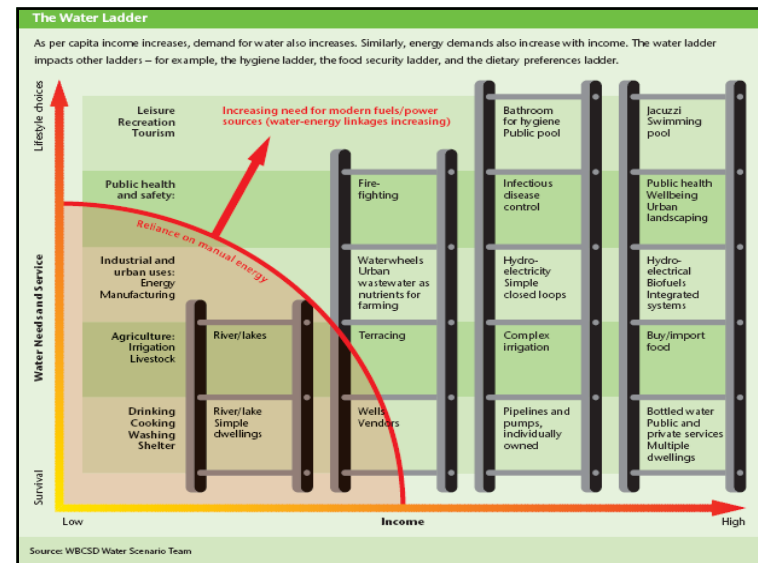
"The wars of the next century  
 will be about water"

*World Bank Vice President  
 Ismail Serageldin, 1995*

## So what are the reasons and what can be done???

### Reasons:

- water scarcity
- water consumption (the water ladder)



## What can be done???

- or what can you do??



## Best practice??

**Shower: on Earth: 50-80 l**

**in Space: 10 l**

**Reuse: urin and moisture**

**No water for hairwash and shaving**

**No flush in toilets**



## Examples from DK

- Community Guidelines in new built and existing areas
  - Agenda 21
  - (water savings)
- Citizens competitions
- (water savings)
- Reuse of water
- (water as a resource)



## Community Guidelines

- Agenda 21 as a planning tool
  - Checklists for new built
  - Checklists for renovation
- Consumers manual/guidelines
- Water work's guidelines

<http://www.greencatalogue.com/en-GB12228/Sideri/Greenbuild+system/Green+build+questionnaire.htm>

[www.graested-vandvaerk.dk](http://www.graested-vandvaerk.dk)



## Citizens Competition

- Housing areas (Green Diploma)
  - Competitions
- Public Buildings

[www.hvidovrefermvarme.dk](http://www.hvidovrefermvarme.dk)



## Water as a resource

- Cleaning of grey and dark water
  - Purification of water
  - Reuse examples



## Reuse of water

- The recycling laundry and other reuse examples



## EXPO 2008

- Zaragoza, Spain
- Focus: future use of water

<http://www.expozaragoza2008.es/ES/index.asp>



## Energy

- Scarce resources
- Climate changes CO<sub>2</sub>
- Cities as sustainable energy promoters, not only energy consumers



## Scarce resources (industry)

"A quartet":

- Accessible energy at
- Affordable prices with
- Acceptable impact and
- Adequate returns



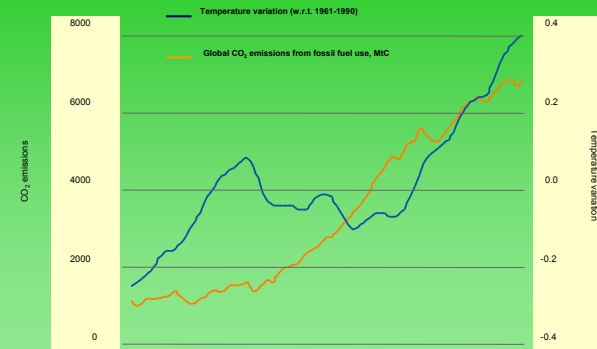
## Facts & Trends

### Growth, development & energy demand

- Energy is the fuel for growth, an essential requirement for economic and social development.
- Energy demand could double or triple by 2050 as a result of development.



## Facts & Trends



Source: Hadley Centre and CDIAC



## Facts & Trends

### Energy use and climate impacts

- Carbon dioxide levels in our atmosphere are rising, as is global temperature.
- By starting to manage carbon dioxide emissions now, we can limit the change.



## Facts & Trends

The impact on our climate could be substantial even at an achievable stabilization level, so adaptation to climate change will have to play a part of any future strategy.

Impacts will vary from region to region; much of the detail is uncertain.



## Facts & Trends

Measures might include:

- Flood defences in low-lying areas, ranging from Lisbon to Copenhagen
- Refugee planning for islands
- Improved water management (e.g. aqueducts) as rainfall patterns change



## Facts & Trends

### The dynamics of technological change

- Global technological change is a lengthy process, measured in decades.
- Very large systems such as transport and energy infrastructures can take up to a century to fully develop.



## Facts & Trends

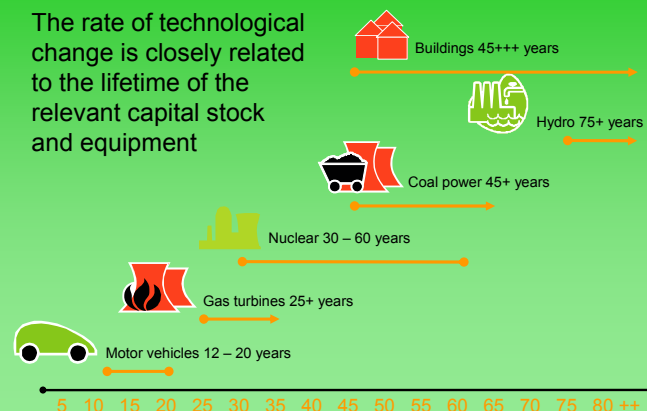
Many advocate that a rapid change in our energy infrastructure is the only solution to the threat of climate change. However:

- Major transitions at the **global level will take time** to implement
- The speed with which **new technologies diffuse** depends on many factors.



## Facts & Trends

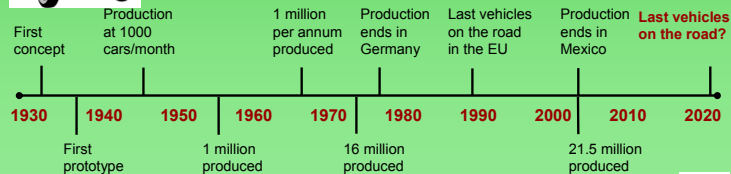
The rate of technological change is closely related to the lifetime of the relevant capital stock and equipment





## Facts & Trends

New technologies in developed countries may arrive, mature and even decline before their widespread adoption in developing regions.



## Facts & Trends

### Reshaping our energy future

- By 2050 energy demand will be sharply higher, but global carbon emissions must be no higher than today and trending downward.
- No single solution will deliver this change.

Above all, we need to start now.



## Facts & Trends

### Sir Nicholas Stern (economy)

- 100 mio = environmental refugees.
  - No change: the bill estimation  
**€ 5,333 billions**
  - Only 1 % of GNP – now!



## Facts & Trends

### In EU:

EU energy supply is topical  
Common EU policy in 2007?  
EU focus on buildings (directive concerning energy performance demands)



## Facts & Trends

### In Denmark:

- No increase in energy consumption since 1975
  - though the GNP has increased by 54 %
- WHY??



## Danish Model

### Focus on

- energy savings
  - energy efficiency (heat and electricity)
  - energy substitutes, i.e. renewables
- (4 P's☺):

**People, planning, politicians  
and public authorities!**



## Short term change

### Basics

- community involvement
- economy ("green taxation")
- information and implementation
- high standards concerning energy efficiency and savings
- **above all: planning!**



## Communities

### Denmark:

Strong co-operative energy sector  
Experience with a range of sustainable energy technologies  
Different types of energy co-ops



## Types of Energy Co-ops - DK

Community-owned wind power  
Community owned PV installations  
Consumer-owned district heating  
Consumer-owned electricity supply  
Farmer-owned biogas production  
Farmer-owned biomass production and  
heating



## Co-operative Culture

### Basis:

Distribution of benefits to communities  
through co-operative ownership (160 years)  
Co-ops represent a familiar model for  
projects at a community scale



## What is a co-op?

Independent, democratically controlled  
enterprise, owned and governed by their  
members, with the aim of meeting  
common social, economic and  
environmental needs.



## Principles

- Voluntary and open membership
  - Democratic member control
- Member economic participation
  - Autonomy and independence
- Education, training and information
  - Co-operation among co-ops
  - Concern for community



## Examples

- Middelgrunden offshore windmills
- Copenhagen Solar Co-op
- Energy Day



## Planning and Co-operation

- Buildings
- Renewables
- Training/Education/Information
- "Cross the boarder"  
- and do it now!

