



# Climate and Water

## Climate initiatives in regional water management

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14 December 2009



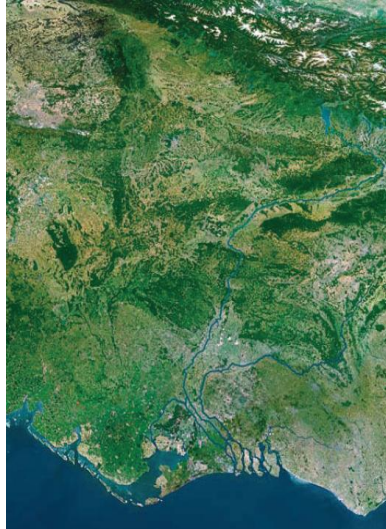
## Netherlands: 26 Regional Water Authorities



### Water management tasks:

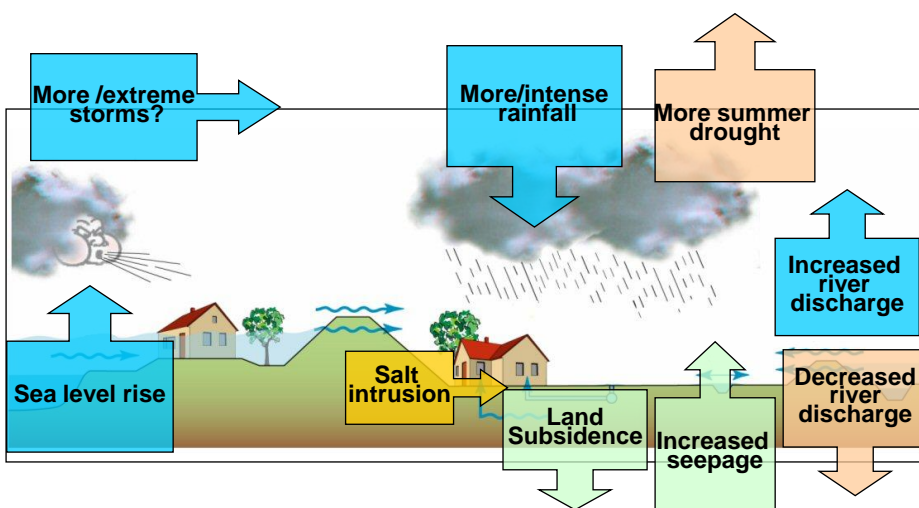
- Flood protection
- Surface water quantity (drainage and irrigation)
- Surface water quality
- Urban wastewater treatment
- 2010: operational groundwater management
- 11.000 fte, 2,4 billion euro/year

## Dutch delta, a different perspective



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## Climate Change a summary



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## ☰ Climate change, some numbers



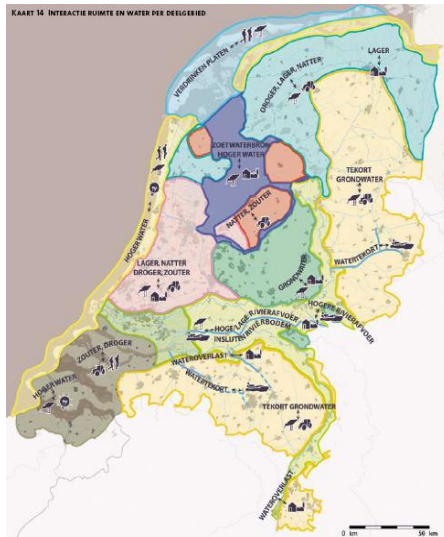
The Netherlands:

- Sea level rise (+35 to 80 cm in 2100)
- More/intense rainfall (+5 to 25% in 2050)
- Increased river discharge in winter (+10 to 25% in 2050)
- Decreased river discharge in summer (0 to -40% in 2050)

## ☰ Consequences of Climate Change



## Water and spatial developments



- Flood risks
- Water shortage
- Land subsidence
- Salt intrusion

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## But we can do more

- 30% energy production by bio gasses in 2008
- each facility can produce 0,30 MW electricity
- this equals the energy use of 900 households

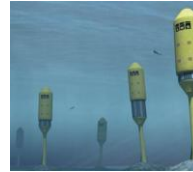


**ENERGIE  
FABRIEK**

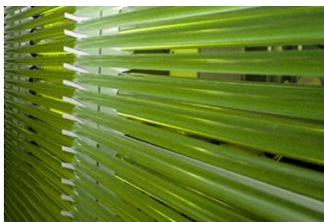
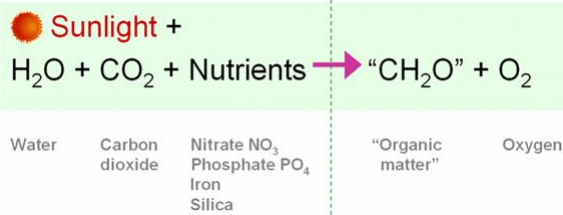
- Long term perspective: 350 facilities in The Netherlands have the potential to produce energy for more than 200.000 households

## ☰ There is energy in water

- Water force
- Salt – fresh water potential
- Tidal energy
- Wave energy
- Hydrogen
- Bio-fuel



## ☰ Algae bio fuel



37.050 gallon oil/ha/year

## 🗑️ Long term perspective algae

- Contribution in waste water treatment
- Ethical
- CO<sub>2</sub> neutral
- Alternative for petrochemical industry



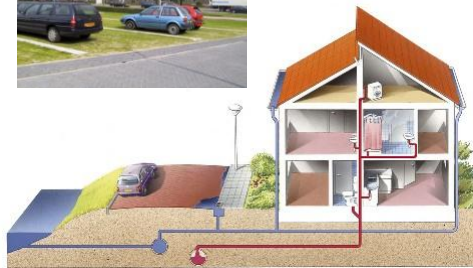
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## 🗑️ Chain efficiency

- Input (rain, pollutants, sewage influent, chemicals, energy)
- Troughput (optimization transport & treatment)
- Output (gas, sludge, heat, effluent)

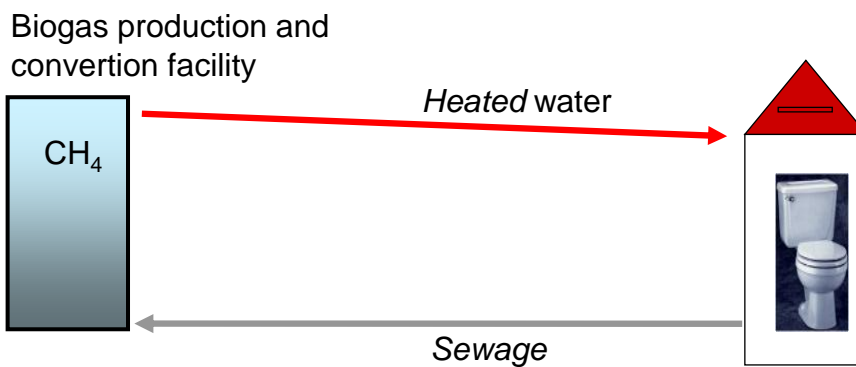


## Example chain efficiency: rain water infiltration



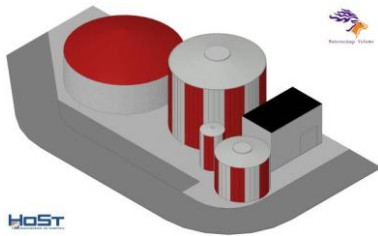
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## Example chain efficiency: energy production



## Example chain efficiency: heating

- Heating for 2.500 households

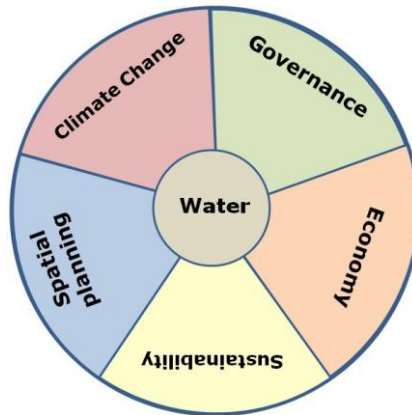


## The Turkish ambition



- More than 2.500 facilities needed ( $\approx 1,5\%$  of industrial consumption)
- Share Dutch knowledge on waste water treatment and energy efficiency
- EU Long Term Agreement on energy efficiency improvement





 UNIE VAN WATERSCHAPPEN