

# CIE4485

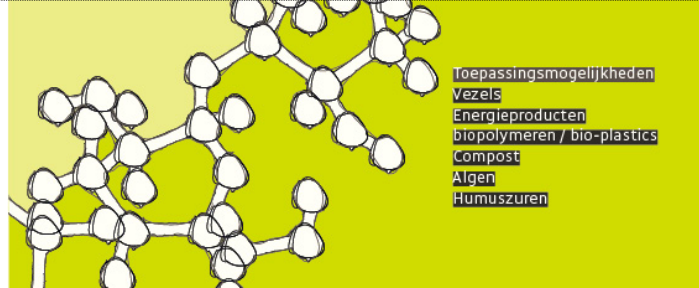
## Wastewater Treatment

Charlotte van Erp Taalman Kip  
Guestlecture

16. The Resource Factory



## The Resource Factory (De Grondstoffenfabriek)

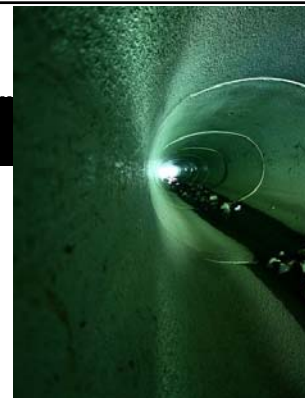


Toepassingsmogelijkheden  
Vezels  
Energieproducten  
biopolymeren / bio-plastics  
Compost  
Algen  
Humuszuren

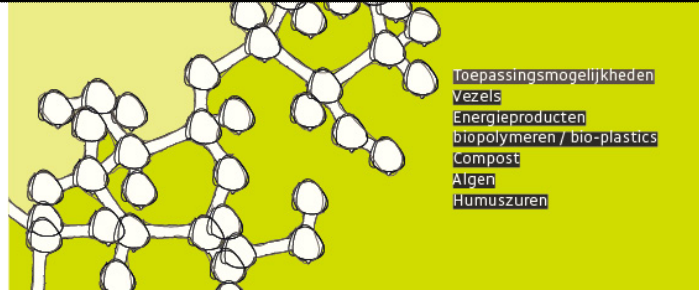
Charlotte van Erp Taalman Kip  
Waterschap Hollandse Delta  
January 10th TU Delft

## Take home messages

- ♻️ Waste water is the new 'bio-oil'
- ♻️ The concept is applicable worldwide
- ♻️ Water boards cannot make the transition by themselves
- ♻️ New forms of cooperation (golden triangle) are crucial

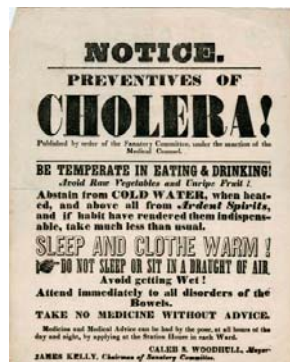


## Back in history....



## Transition in the field of waste water

- Safeguarding public health



## Transition in the field of waste water

- Safeguarding public health
- Protecting the environment



## The Dutch water boards:



## The Dutch water boards:



## Transition in the field of waste water

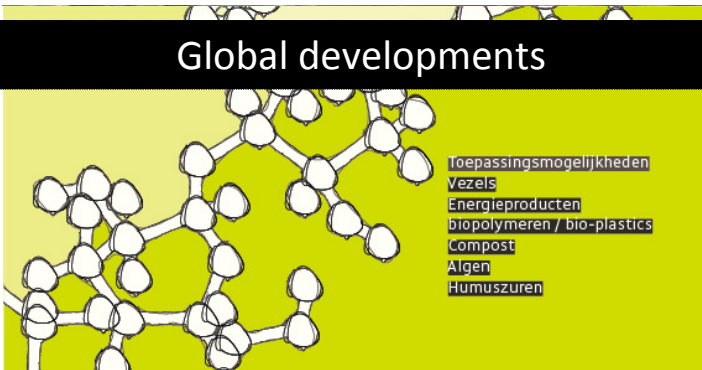
- Safeguarding public health
- Protecting the environment
- Focus on energy reduction due to global warming



## Transition in the field of waste water

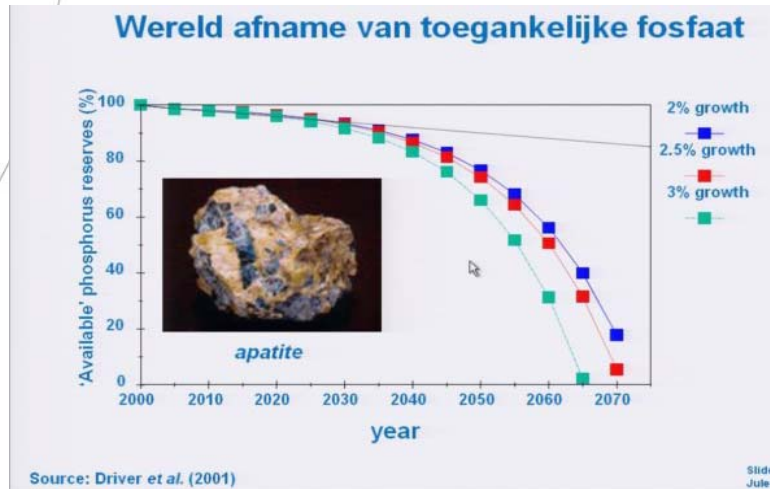
- Safeguarding public health
- Protecting the environment
- Focus on energy reduction due to global warming
- **Increasing attention towards resource scarcity**

## Global developments

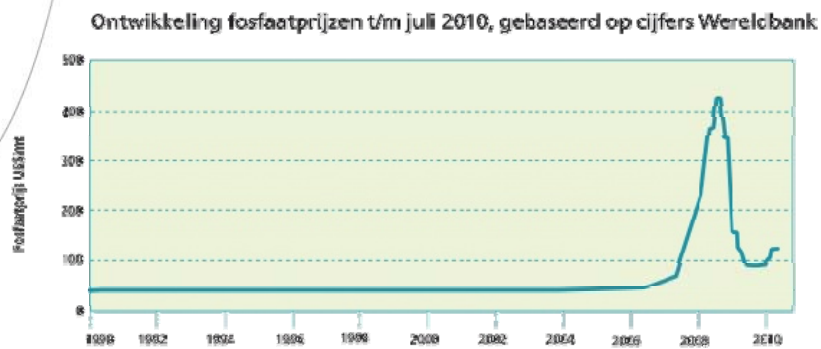


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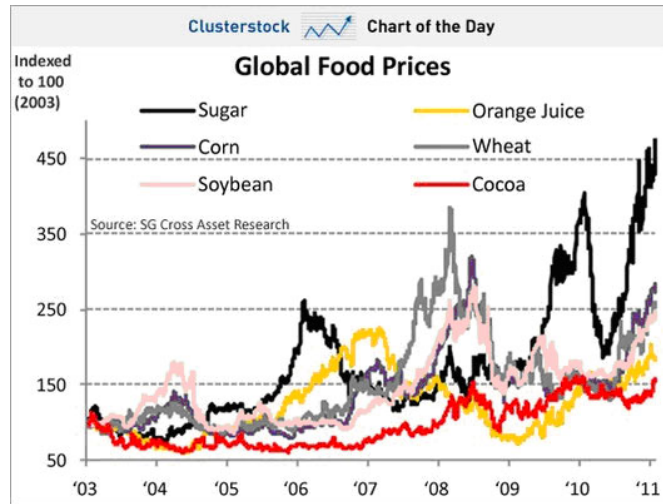
## Phosphorous reserves are running out!



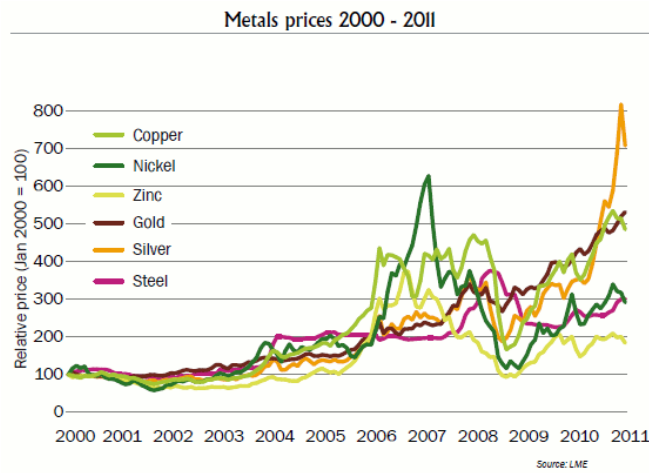
## Price peak due to export restrictions China



## Increasing prices - food



## Increasing prices - metals

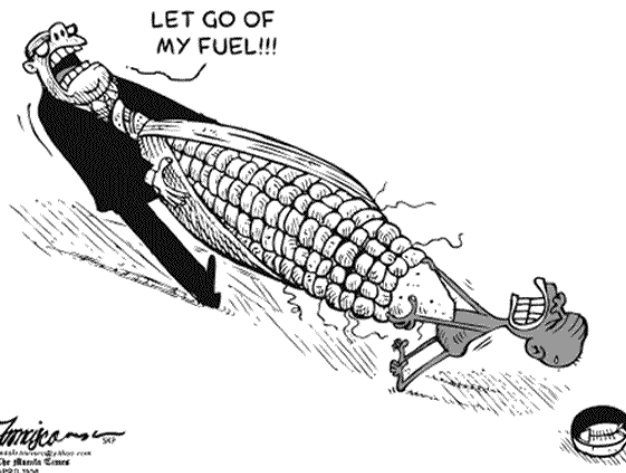




Wars start...



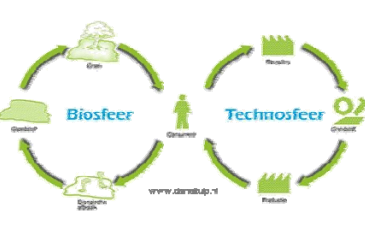
Biomass scarcity- food vs fuel



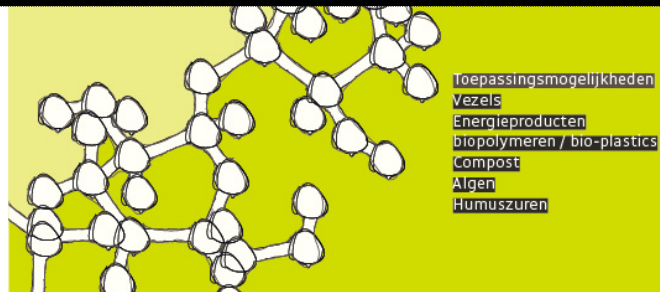
# From fossil fuel based...




# ...to bio-based



## National developments



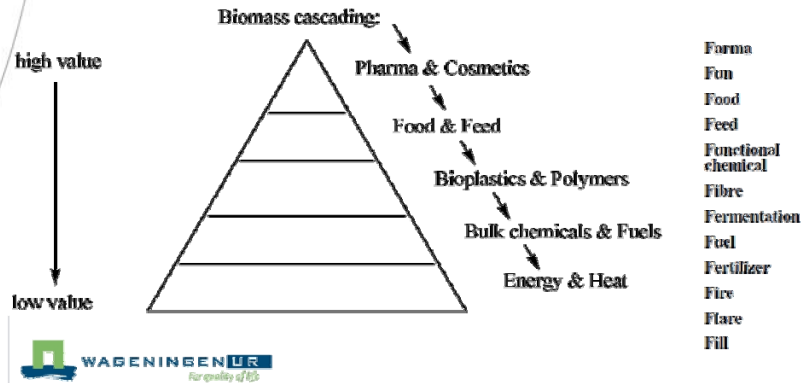
## Biobased Economy

- Nice opportunities for Biobased Economy (SER)  
 (Top)Sector Chemie – transition pathway to biobased chemistry

- Too much attention on biomass for energy

*'Het is jammer dat de maatschappelijke aandacht voor groene grondstoffen zo geconcentreerd is rond energie. De negatieve gevolgen van het gebruik van biomassa worden daardoor uitvergroot: productie van energie uit groene grondstoffen vraagt veel meer land dan productie van materialen. ...Dit moet worden rechtgezet'*  
(Wetenschappelijke en Technologische Commissie EL&I, maart 2011)

## Value pyramid



## Developments at the water boards

- Increasing attention towards sustainability, energy and resource scarcity
  - ♻️ Paradigm shift 'waste = resource'



"I'm afraid you've had a paradigm shift."

## Grondstofffabriek

Visiebrochure  
Afvalwaterketen tot 2030

### Roadmap 2030

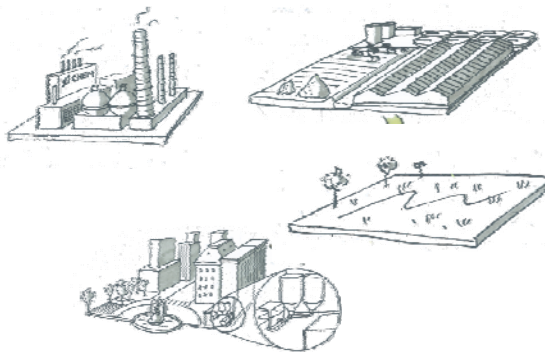


- Long term vision on the water use cycle
  - ⌘ 'Waste = resource'
    - Nutrients – Resources
    - Energy
    - Water
  - ⌘ Local future scenarios for closing loops

## Grondstofffabriek

### Scenarios for the future

- ⌘ There is not one 'blue print'
- ⌘ Local situation and local ambitions of government etc.
- ⌘ 4 physical locations:







## The challenges of the water boards

*Wouldn't it be great  
if....*

### ■ Sustainability (People, Planet, Profit)

- ♻️ Klimaatakkoord: breed (april 2010)
- ♻️ Locale Klimaatakkoord (oktober 2011)
- ♻️ Green Deal (oktober 2011)
- ♻️ Ketenakkoord Fosfaat (oktober 2011)
- ♻️ Meerjarenafspraken Energie (MJA3) (juli 2008)
- ♻️ Routekaart afvalwaterketen 2030
- ♻️ Samenwerken in de Afvalwaterketen (Bestuursakkoord Water)
- ♻️ Energiefabriek

## Waste water: 'new oil'

### THE MOVIE

Toepassingsmogelijkheden  
Vezels  
Energieproducten  
biopolymeren / bio-plastics  
Compost  
Algen  
Humuszuren

## Grondstofffabriek

### Wat *is* the Resource Factory actually?

Installation (tangible) 2018??

Transition team  
(30 people)



Concept (abstract) 2013

## Grondstofffabriek

### Complexity

- How to organize?
- Roles and responsibilities

process

- Legal obstacles
- Creating a value chain

- Developments of concepts
- Which technologies?
- Quantity & quality of resource
- Technical obstacles
- Relation with energy recovery
- ...etc...

local situation

content

market

- Logistics
- Product specifications
- Prices



## Grondstoffenfabriek

### Concrete steps Transition team

#### 4 work groups

- bio-plastics
- phosphate
- cellulose
- communication

#### Coordination

- Waterschap Vallei & Veluwe
- Waterschap Hollandse Delta

### Questions?

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