

# Exploring the potential for biofuel crops in the Netherlands

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## Outline

- Overview of bioenergy options
- Reed as a bioenergy crop
- Reed as part of multifunctional land use
- Scenarios
- Results



## Overview of bioenergy options

- Starch crops for ethanol
- Oilseed crops for biodiesel
- Waste flows
  - Urban waste
  - Agricultural waste
  - Forestry waste
- Biomass
  - Grasses, e.g. miscanthus, reed
  - Woody species, e.g. willow, poplar



## Reed and multifunctionality

- Indigenous in the Netherlands
- Grows well in wet areas
  - Salt tolerance
  - Suitable for peat soils
  - Combination with water retention projects
- Can absorb many pollutants
- Carbon storage above and below ground
- Landscape and nature values
  - With limitations



## *Phragmites australis*



## Reed as a bioenergy crop

- Yield (dry biomass):  $10-40 \text{ t.ha}^{-1}.\text{yr}^{-1}$ 
  - We work with  $15 \text{ t.ha}^{-1}.\text{yr}^{-1}$ , without fertilizer
- Three ways to convert into energy:
  - Ethanol:  $48 \text{ GJ.ha}^{-1}$
  - Burning (heat, electricity):  $266 \text{ GJ.ha}^{-1}$
  - Biogas (co-digestion with 75% manure):  $60 \text{ GJ t.ha}^{-1}$
- Value ( $\text{€}.\text{ha}^{-1}.\text{yr}^{-1}$ , current energy prices)
 

● Ethanol	1,151
● Combustion	475
● Biogas	625

## The economics

- Net yield of bioenergy (€·ha<sup>-1</sup>·yr<sup>-1</sup>): -835
- Net effect on GHG emissions (peat): 271
- Water storage (where applicable): 400
- Water purification: 400
- Total (not including landscape/nature) **236**
- Net yield on grassland 800

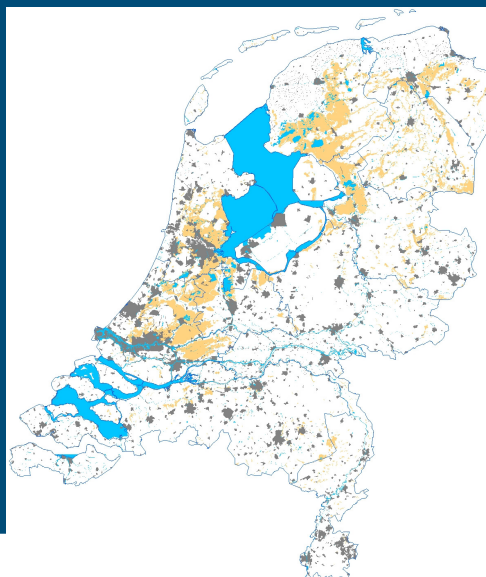
## The scenarios for 2030

1. Reference: based on IPCC B1
  - Ongoing policies, incl. liberalization of agricultural trade
2. Same as 1, but with high oil price and high climate change
3. Same as 1, but with promotion of biofuels in Europe and elsewhere
4. Same as 3, with policies for climate change adaptation and mitigation
  - Including soil actions

## The problem of peat

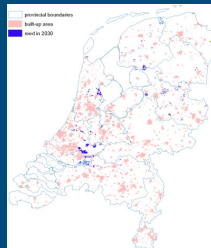
- Peat covers 8% of the land area of the Netherlands
- Mostly used for dairy pasture
- Drainage leads to oxidation
  - Subsidence
  - CO<sub>2</sub> emission (loss of organic matter)
  - Risk of saline seepage
- Hence, doubts on long-term sustainability
- Scenario 4: policy to reduce peat erosion

## Peat distribution in the Netherlands

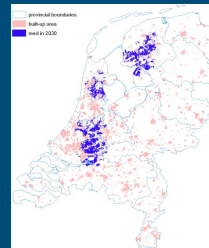


## Results

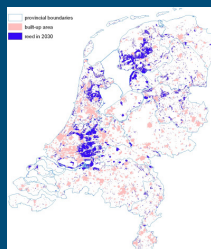
Reference



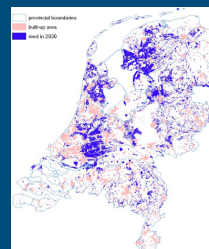
High oil  
price &  
climate  
change



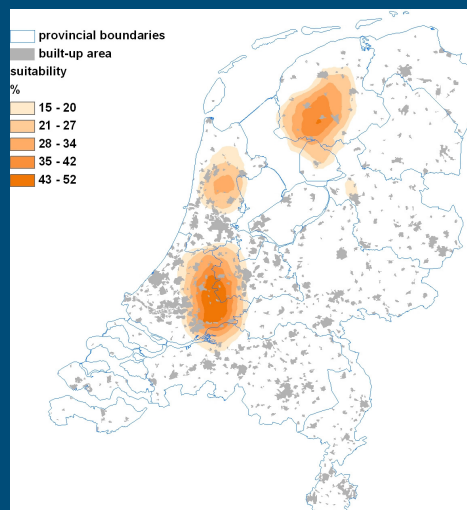
Bioenergy  
promotion



Bioenergy  
promotion  
plus soil  
protection



## Locations for reed processing plant



## Biogas: manure production



## Conclusions

- Reed cultivation is something that might happen in a multifunctional context under scenarios where
  - High energy prices
  - Significant climate change
  - And strong policies aimed at adaptation & mitigation are in force
- It is particularly suitable on peat, where it may outcompete or be combined with dairy production
- Burning in a power plant is the best path at present
  - Ethanol may be attractive if technical problems can be overcome
  - Biogas is a possibility for small-scale production in combination with dairying
- Biogas potential is underutilized in the Netherlands

# Thank you

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