



## VIDA EU project

Zero emission of water and nutrients in a Dutch greenhouse

s Gravenzande, NL      30-07-2019



**VIDA**  
value-added innovation  
in food chains



Where happiness grows



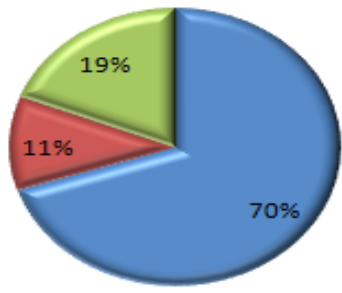


**WATER FUTURE**  
when every counts.



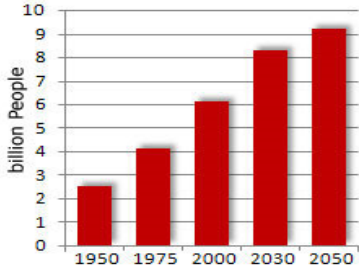
## water scarcity

### Global sum of all withdrawals



Category	Percentage
Agricultural	70%
Municipal	11%
Industrial	19%

### World Population Growth 1950-2050



Year	Population (billion)
1950	2.5
1975	4.1
2000	6.1
2030	8.3
2050	9.7

World-Crisis.net      Source: UN

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## Dutch greenhouse – success story

### Facts

- world 2nd biggest food exporter
- huge area's are covered by glass
- crop yield more than double
- technology and science pushing to agricultural boundaries
- 90 % reduction of water usage

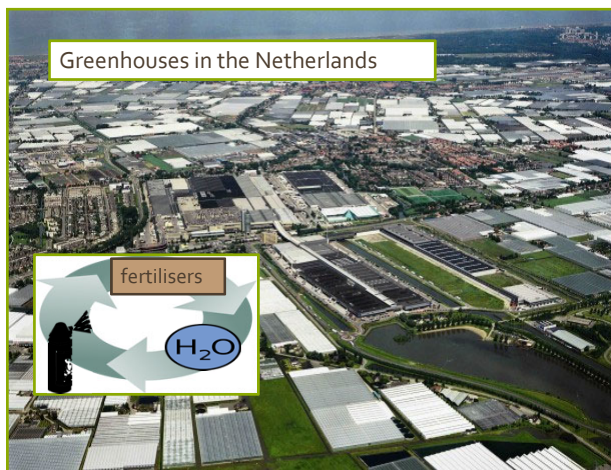


### Amazing

- the Netherlands
- densely populated
- No.1 USA – 270 \* bigger
- 140 countries adopted Dutch greenhouse technology

Source National Geographic – World Economic Forum

## Dutch greenhouse – limitations



### Water discard

#### Reason

- high Na<sup>+</sup>
- poison for crops



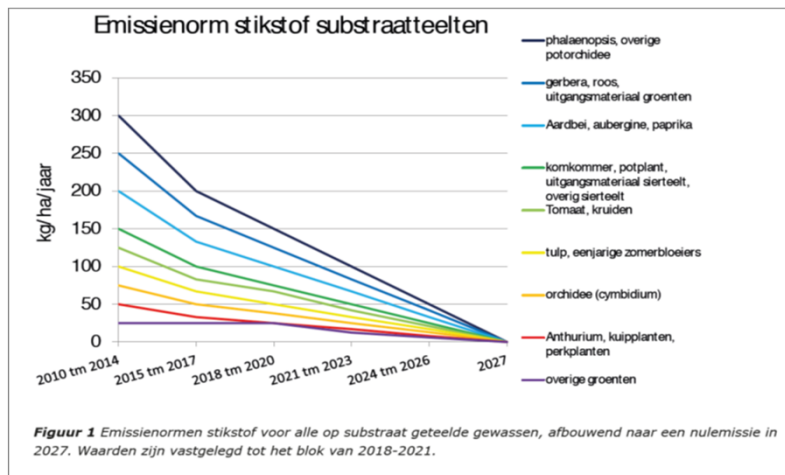
#### Consequence

- pesticide release
- environmental pollution
- 2018: forbidden

#### Longer term

- 2027: zero emission

## ambition of Dutch government



2027 target

- no emission of water
- no emission of nitrates

collaborative approach

- implement best practice
- no penalties (yet)

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## Netherlands - environmental impact

rough calculations

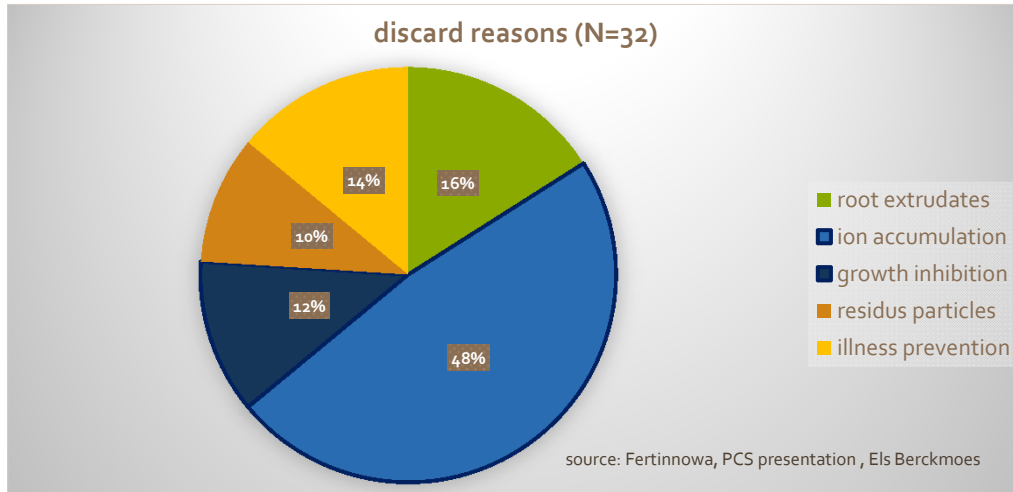
- average daily discard : 2 m<sup>3</sup> per hectare
- NL greenhouse total : 10.000 hectares
- **water discard** : **20.000 m<sup>3</sup> daily**
- concentration nutrients : 2.5 kg / m<sup>3</sup>
  - Na<sup>+</sup>, K<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>
  - NO<sub>3</sub><sup>-</sup>, Cl<sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, PO<sub>4</sub><sup>3-</sup>
  - micron nutrients: Fe, Mn, Zn, B, Cu, Mo
- **nutrients discard** : **50.000 kg daily**

discard after treatment

- surface water
- sewer

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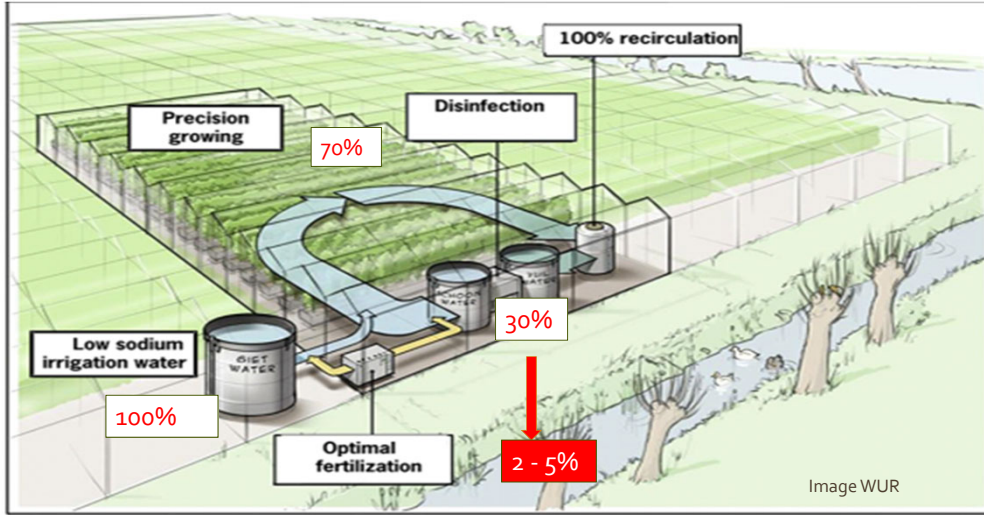
## reason – Na<sup>+</sup> accumulation in Drainwater



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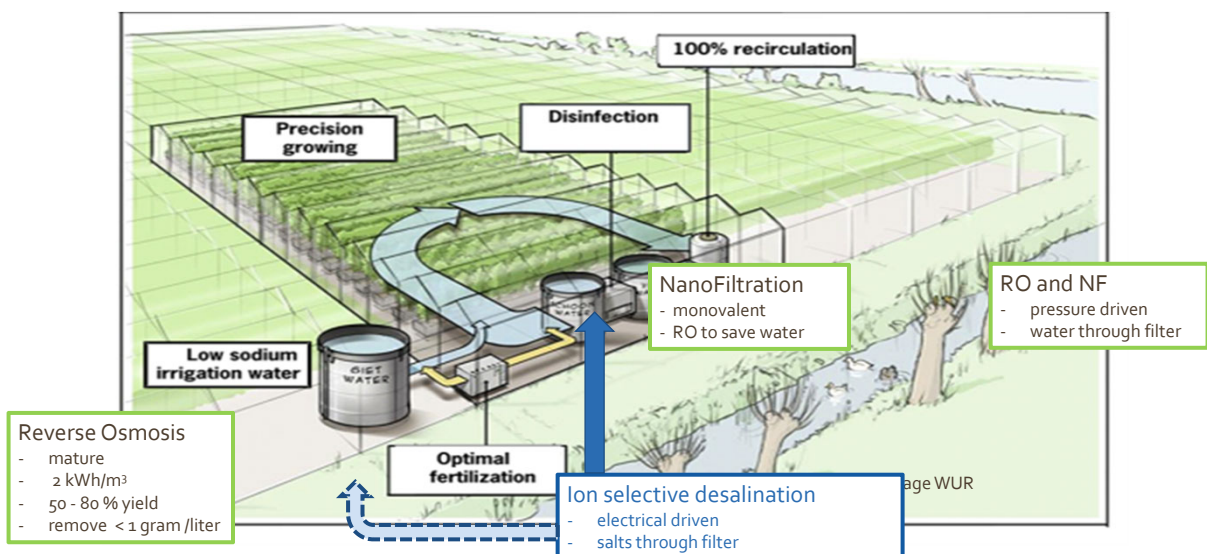
Zero emission possible ?

## greenhouse practice – water & nutrient balance



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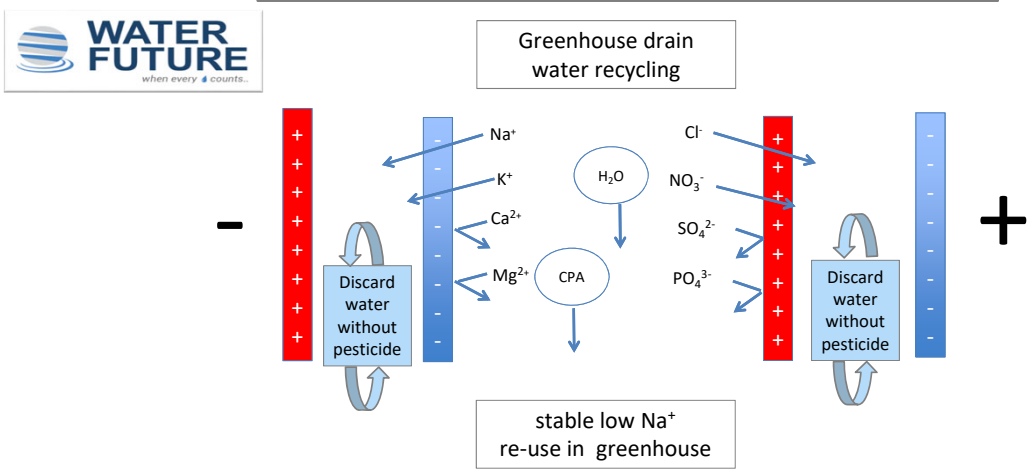
## Zero emission – best available technology



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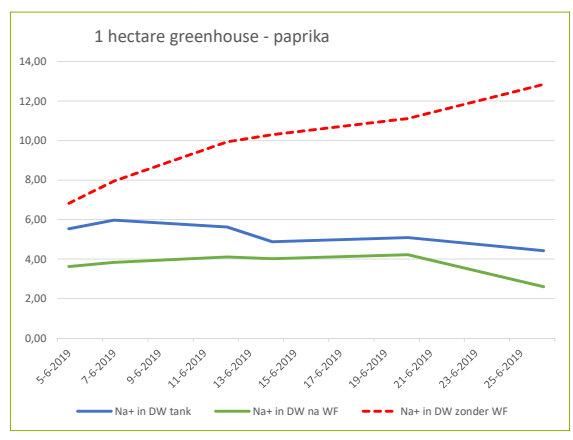
## developed technology

An ion-selective desalination system in drainwater recycling



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## Greenhouse solution : sustainable & profitable



- Advantages
- ✓ efficient Na<sup>+</sup> removal
  - ✓ stable Na<sup>+</sup> level in recirculation water
  - ✓ > 80% water saving
  - ✓ 80% multivalent nutrient savings
  - ✓ 80% micro nutrient savings
  - ✓ no pesticide emission
  - ✓ simple and efficient
  - ✓ cost effective
  - ✓ **more productivity > more money**

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## VIDA project demonstration voucher(=DV002)

### Zero emission water & nutrients for food production in greenhouse

- treat water for 7 hectare of tomatoes
- consortium: technology provider, greenhouse water installer, grower
- demonstrate advantages
- demonstrate robustness
- demonstrate waste stream valorisation
  
- convince greenhouse owners !!

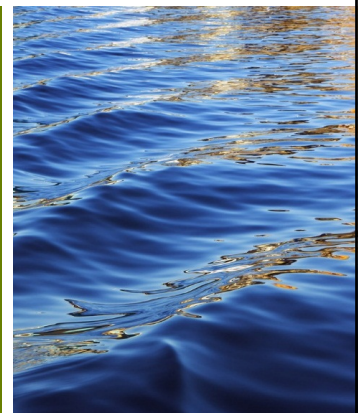
### More sustainable food production with more profit



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## VIDA project submission experience

- competitive call
  - solve a problem in water & food & tech field
- good level of technical readiness – demonstration project
  - good support by CEW & Water Alliance





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thank you for  
your kind attention

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