

# CCU at Twence

## *challenges in realization of Carbon Capture and Utilization*

*European Sustainable Chemical Support Service – Phase 2  
Exploring how capturing and re-using currently emitted industrial gases could be stimulated through industrial symbiosis*

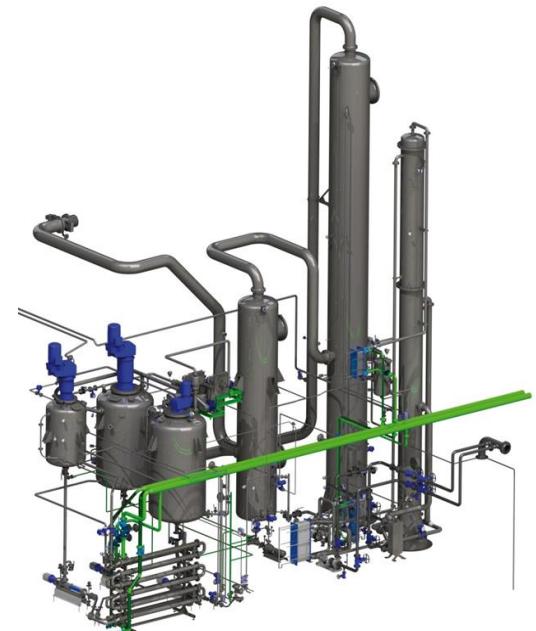
EC DG GROW in cooperation with  
EASME and European Chemical Regions Network (ECRN)

27<sup>th</sup> September 2018 Brussels



# Introduction

- Carbon Capture and Usage @Twence
- Vision for CCU
- Roadmap from 2008 onwards
- Status of upscaling
- Challenges



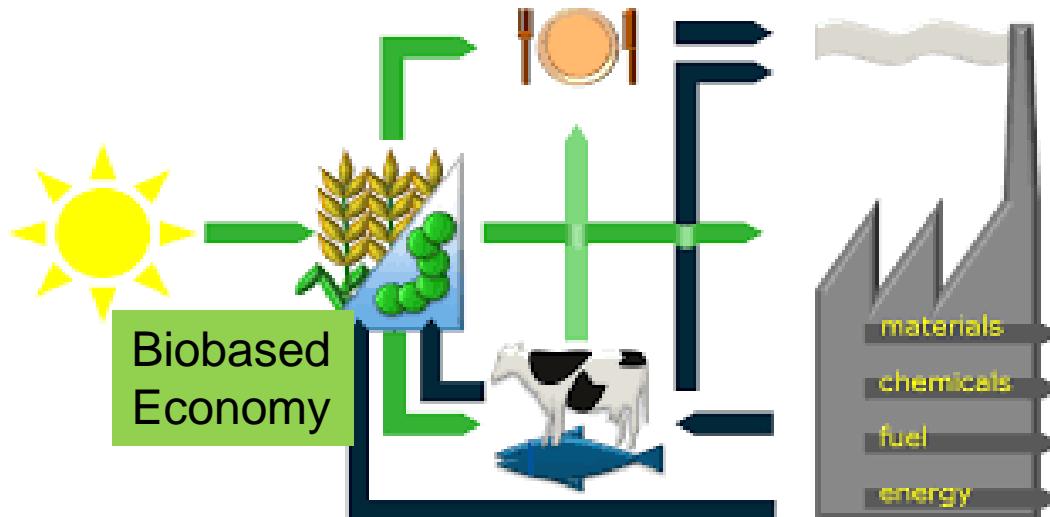
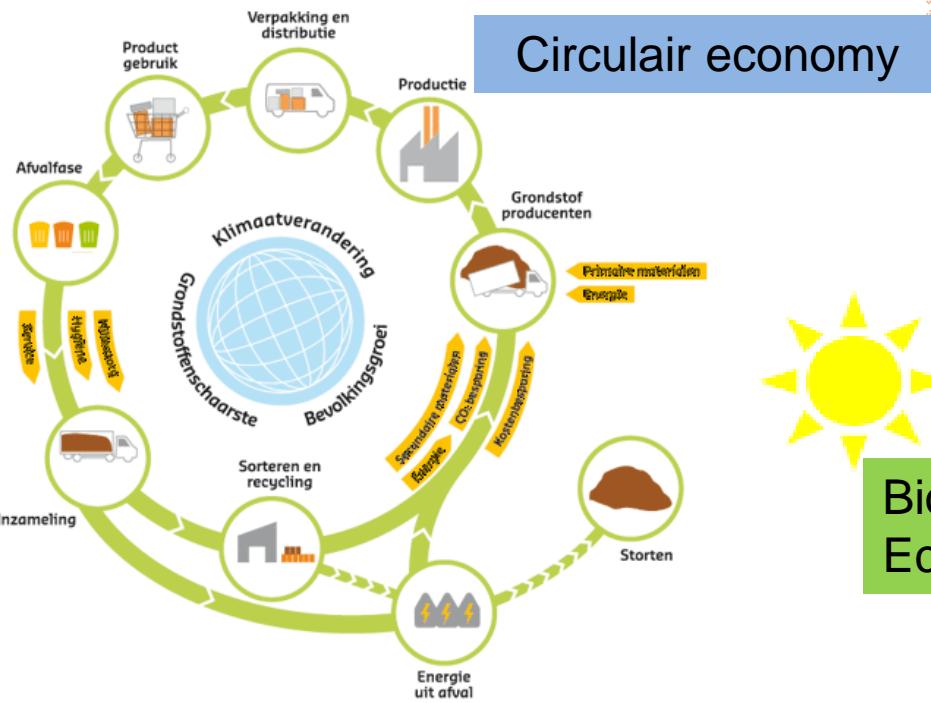
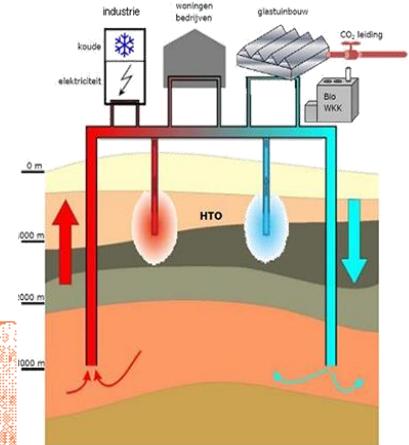
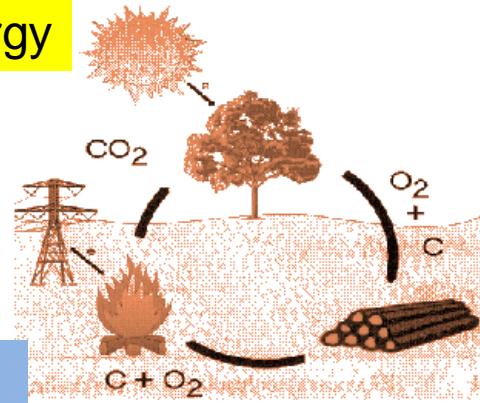
# Carbon Capture and Usage @ Twence



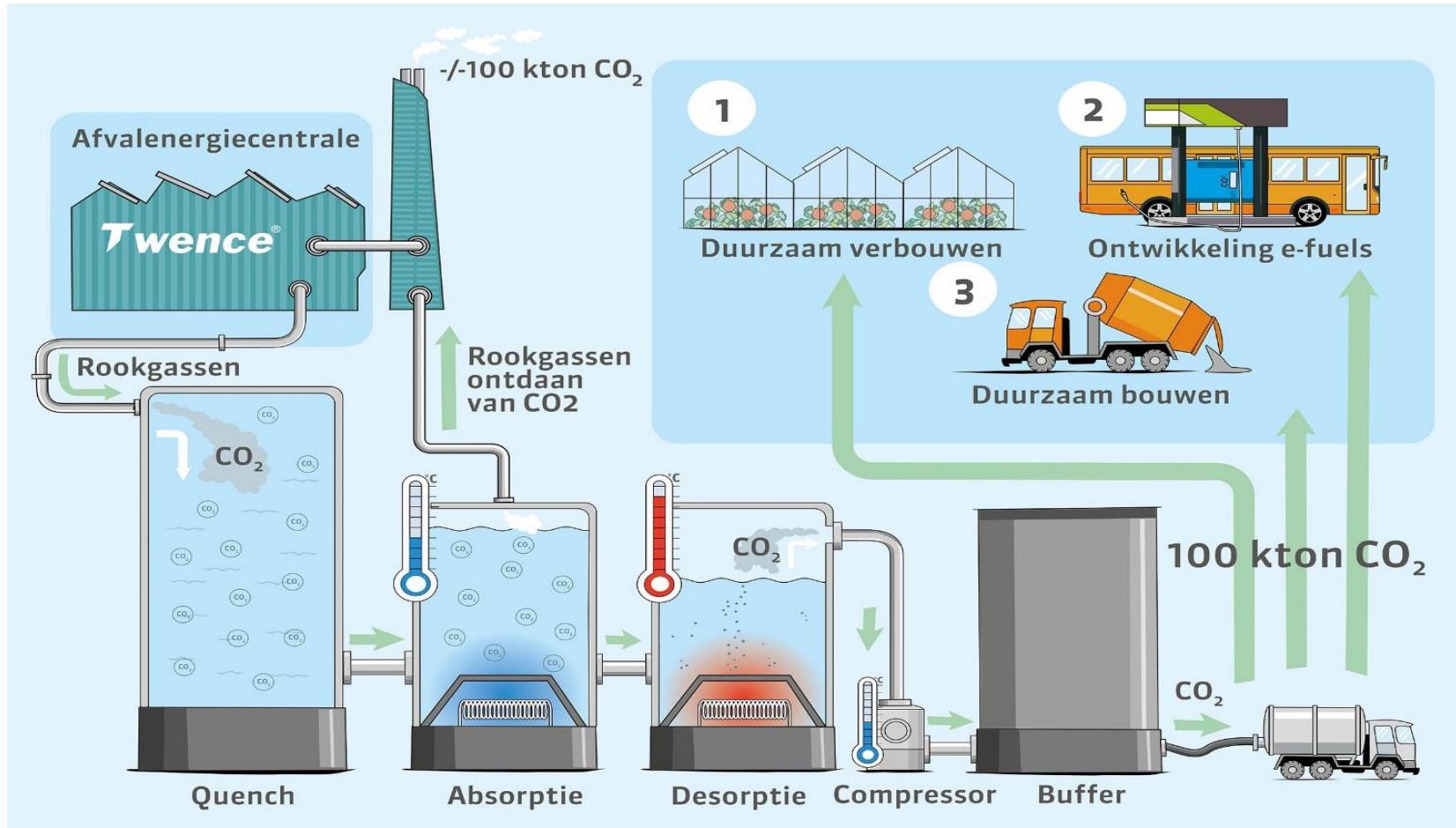
*First installation in the world that 'mineralizes' CO<sub>2</sub> for re-use (absorbent)  
In flue gas scrubbing*

# Twence vision for CCU

Renewable energy



# Twence vision for CCU



# Twence CCU roadmap from 2008 onwards

## Rationale for CO<sub>2</sub> valorisation

to produce sodium-bicarbonate (SBC)  
to reduce acid gas emissions (Cl, SO<sub>2</sub>)  
towards zero-emission waste treatment

## Reaction



- CO<sub>2</sub> reduction
- SBC production

3,000 tonnes per year

8,000 tonnes per year

## Roadmap towards demonstration

- |  |  |
|--|--|
| • First idea demo on CO <sub>2</sub> capture | Autumn 2007                            |
| • Start 3 kton/a Demonstration Plant         | July 2011                              |
| • Commissioning                              | October 2014                           |
| • Demonstration Programme                    | 2014 onwards and ongoing               |
| • Preparation 100 kton/a Full Scale Plant    | 2017 onwards and ongoing               |
| • CEWEP Innovation Award                     | 20 <sup>th</sup> September 2018 Bilbao |

# Status of Large Scale CCU

## Positioning

- WtE line 3
- Dry flue gas cleaning line 3
  - ESP
  - Bag House Filter : activated carbon & sodium bicarbonate injection
  - SCR

## Planning

- Start operation Q1 2021

## Key Decision Making Hold Points

- Environmental Permit
- Grants for Subsidies
- Financial Closure
- Approval of Supervisory Board
- Contracts for off take and design & construction



# Challenges

- Development time 10 years from initial idea towards upscaling
- Learning curve (process stability) requires development time
- Uncertainties in upscaling first commercial plant:
  - Inaccuracy operational performance (OPEX)
  - Solvent developments and choices
  - Initially high(er) CAPEX levels required
  - Dependency on (new) subsidy regulations and off take contracts
  - Future policy and financial instruments for CCU
- ‘chicken and egg’ dilemma:
  - Acceleration in Energy Transition needed with regard to 2DG climate issues
  - Uncertainties in upscaling CCU – with emphasis on financeability / support schemes

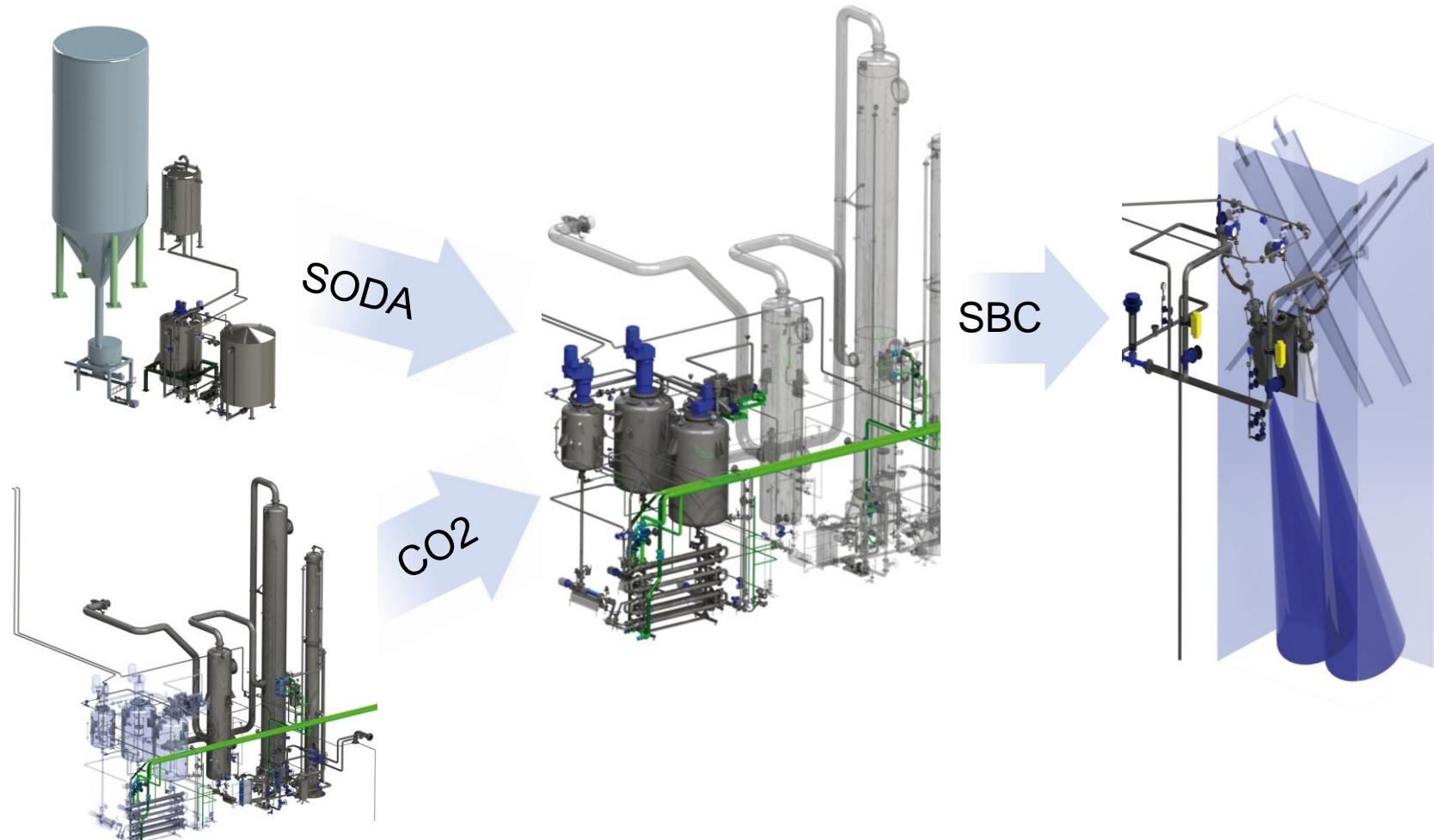
***Risk of delay in project realization whilst acceleration is needed!***

# Thank you very much

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# Bringing innovation to reality...

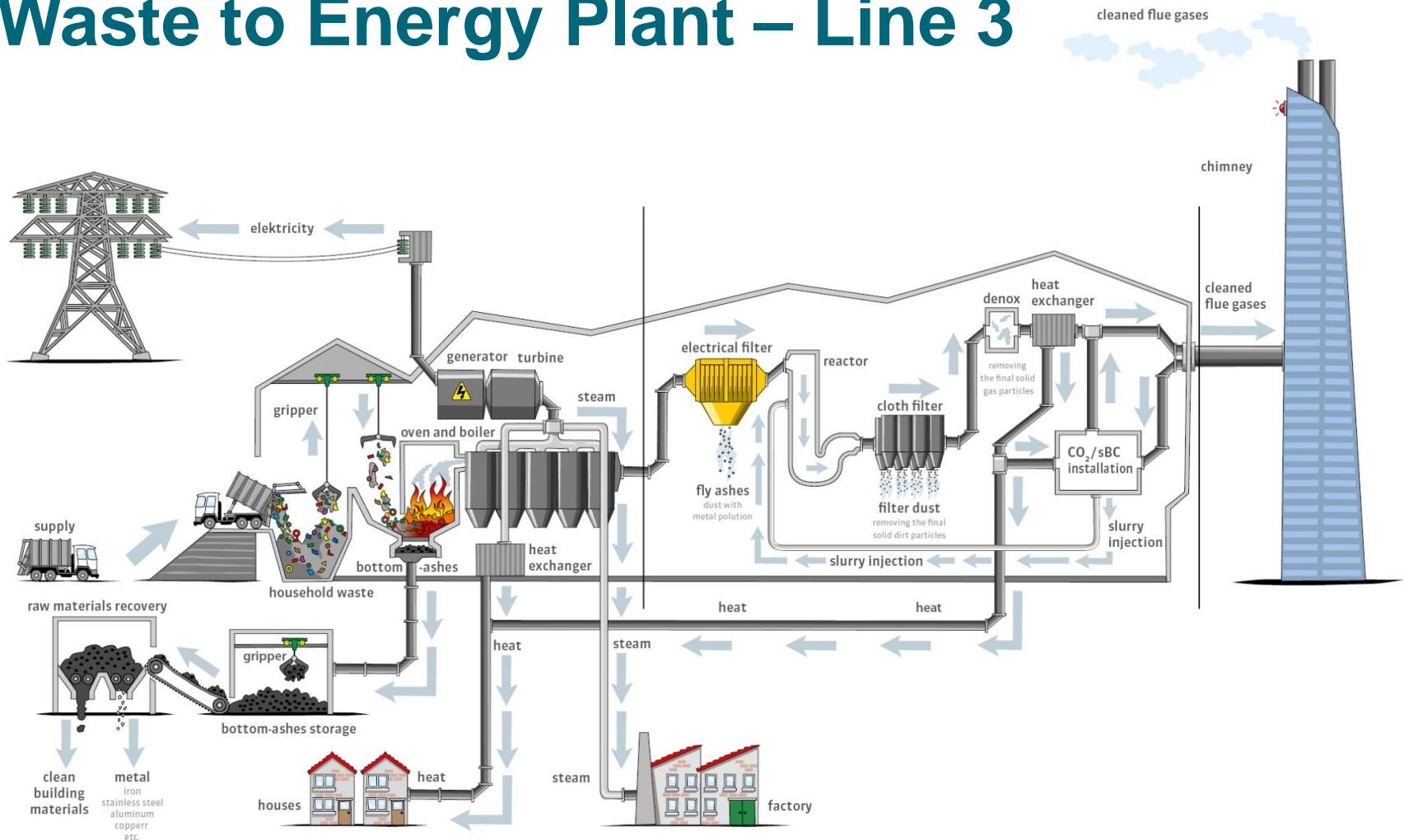


# Results SBC

- Bicarbonate Analysis
- Composition
- Partical Size
- Operations



# Waste to Energy Plant – Line 3



# Basis of Design – basic flow scheme

