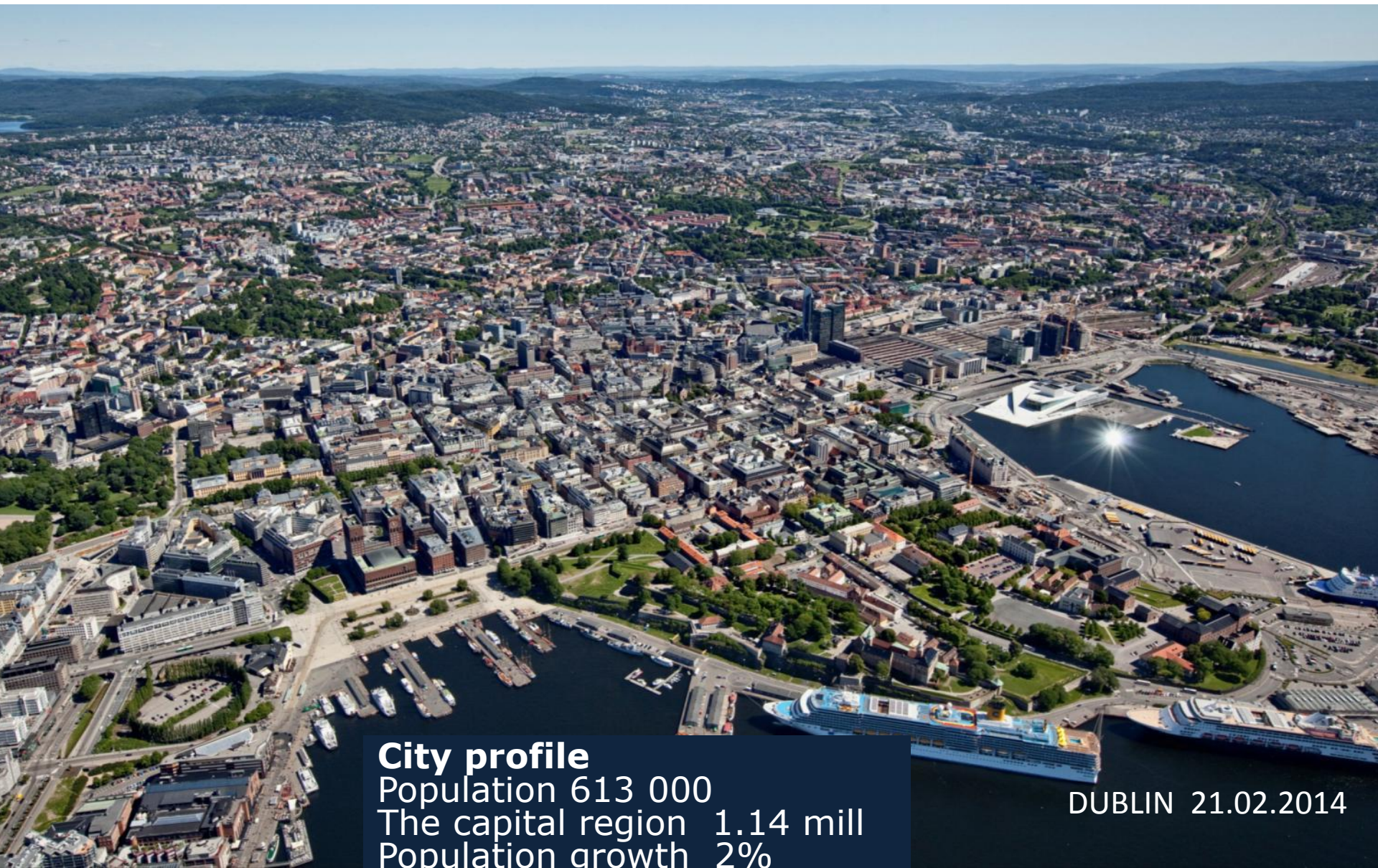


# AD in Oslo- Production of Liquid Biomethane from Sorted Household Waste



## City profile

Population 613 000

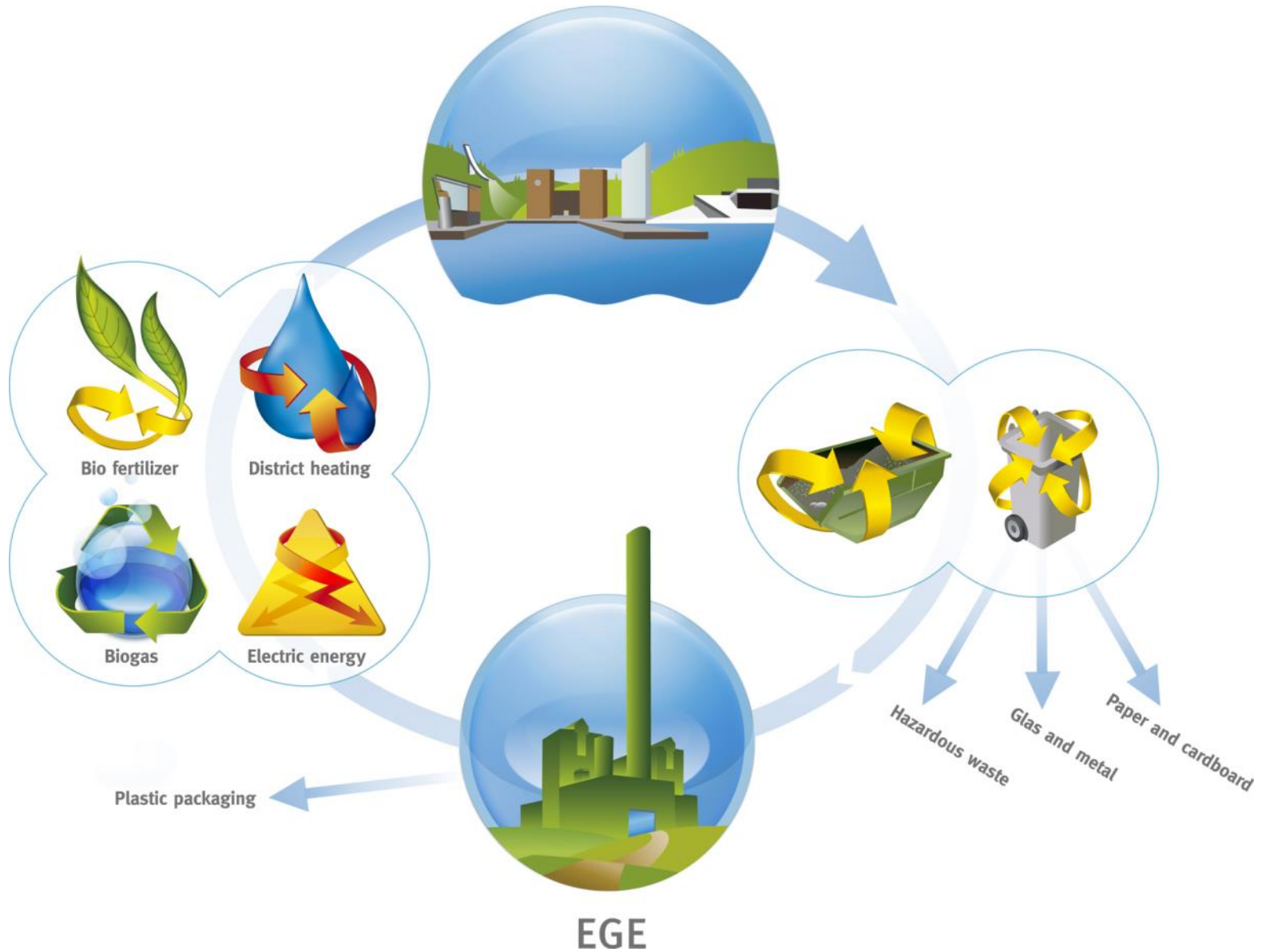
The capital region 1.14 mill

Population growth 2%

DUBLIN 21.02.2014



Oslo



# Source sorting in Oslo







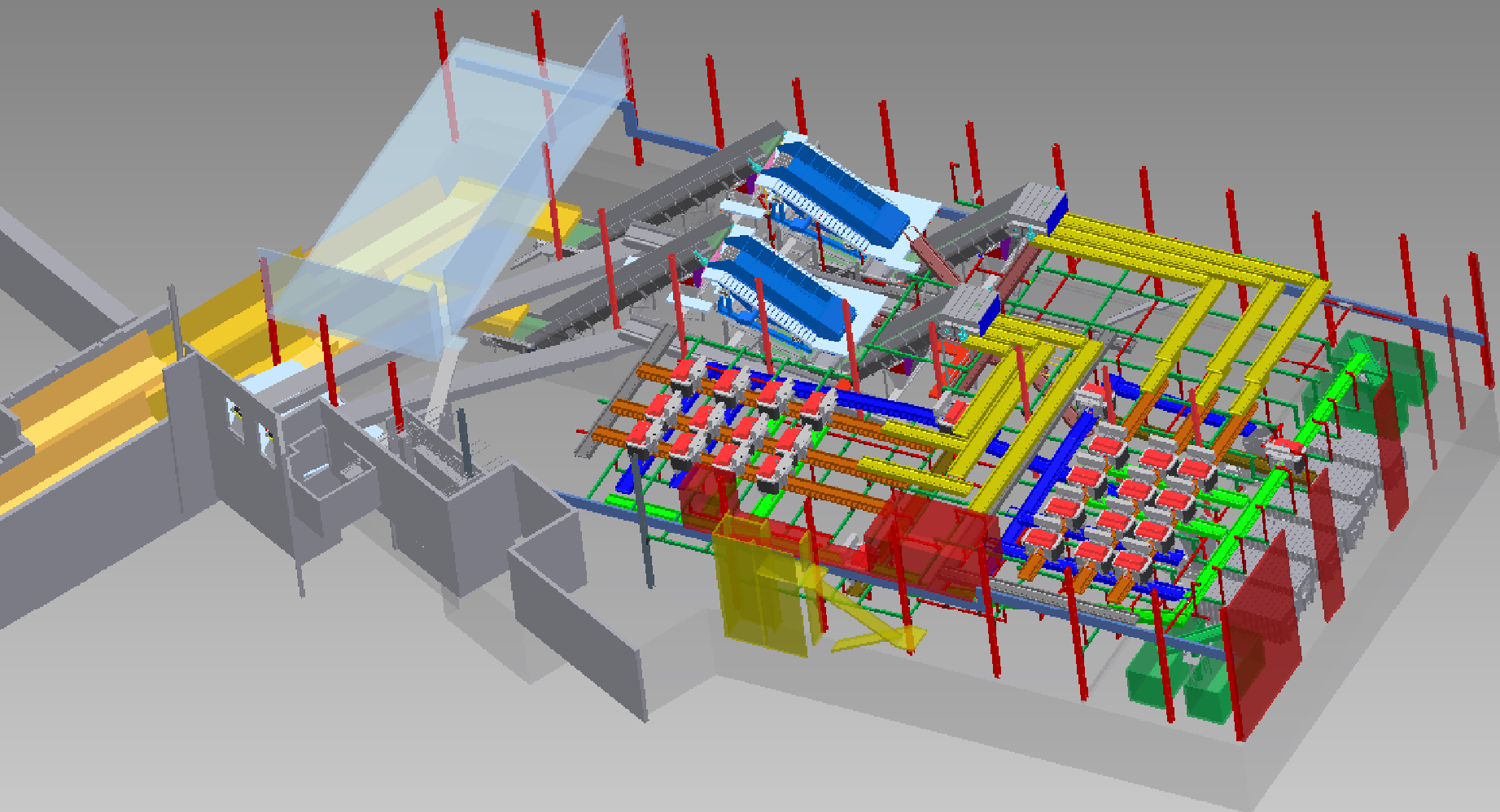
# Optical sorting plant (Optibag)

World's biggest, the only one with mechanical pre-sorting

**Line A and B;** Haraldrud - 100 000 t/y (1. oct 09)

**Line C;** Klemetsrud - 50 000 t/y (april 2012)

Sorted **food waste;** 11 161 t, **plastic waste;** 3263 t (2012)



**Optical sorting plant**



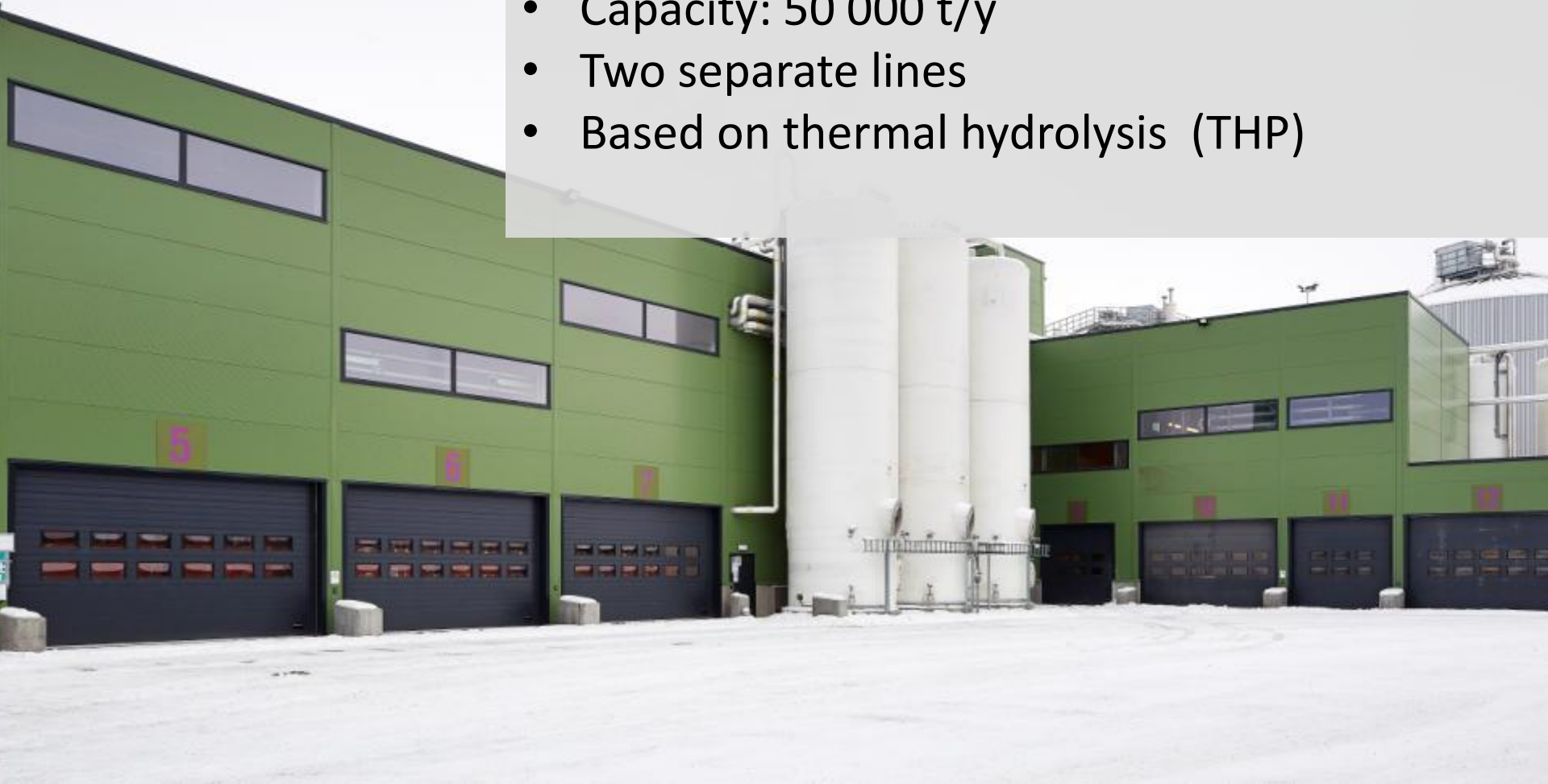
# Biological treatment

- Food waste from households in Oslo
- Industrial food waste
- Biogas for 135 buses
- Bio fertilizer for 100 farms



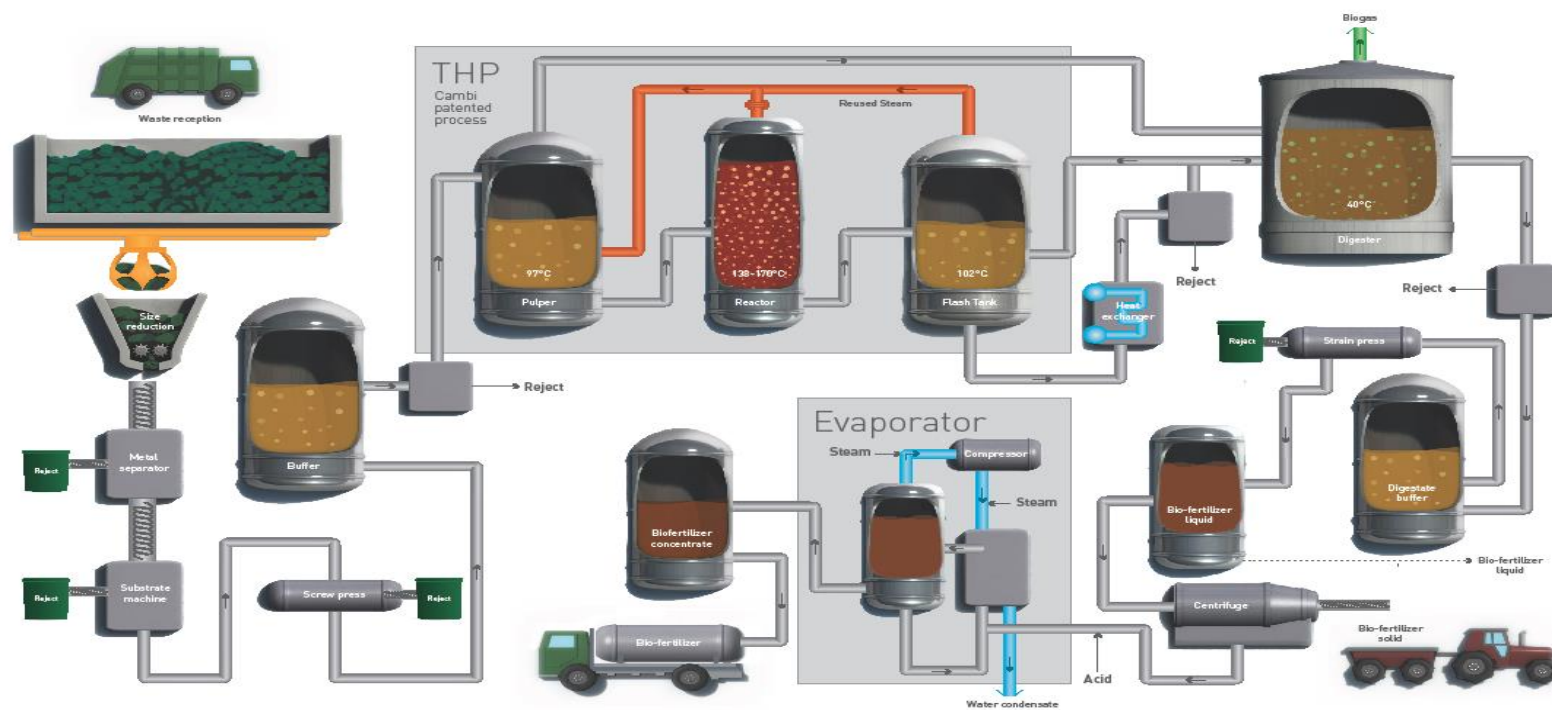
# Romerike Biogas Plant (RBA)

- Finished 20.12.2012
- Production of biogas and bio fertilizer
- Capacity: 50 000 t/y
- Two separate lines
- Based on thermal hydrolysis (THP)





## Process Flow Illustration





The background image shows a large industrial facility, likely a wastewater treatment plant. It features several large, cylindrical metal tanks, a complex network of pipes, and structural steel beams. The scene is brightly lit, possibly by overhead industrial lights. The overall impression is one of a large-scale, modern industrial process.

# Biological treatment (1)

## PRE-TREATMENT

- Shredder, magnetic separator and bio separator/dekantor: Eliminates alien items (25 mm. sifter), water is then added to the process to produce slurry
- Skrew sifters (10 mm.)
- Reject is transported out (sand, plastic etc.)
- Intermediate buffer tank before next step



The background image shows a complex industrial facility, likely a wastewater treatment plant. It features several large, vertical, cylindrical metal tanks with corrugated surfaces. A dense network of thick, silver-colored metal pipes connects these tanks and other components. Some pipes have valves and flanges. The structure is supported by a metal framework. The lighting is bright, coming from overhead industrial lights, creating a clean but industrial atmosphere.

# Biological treatment (2)

## **THERMAL HYDROLYSIS (THP)**

- 1) Pre-heating (80-100 C)
- 2) High pressure “boil” process (130C, 4 atm)
- 3) Flashtank (buffer tank)

## **BIO REACTORS**

- Two tanks at RBA, 3200 m<sup>3</sup>
- 38 C for +/-24 days
- Bacteria culture tearing down the waste produce gas



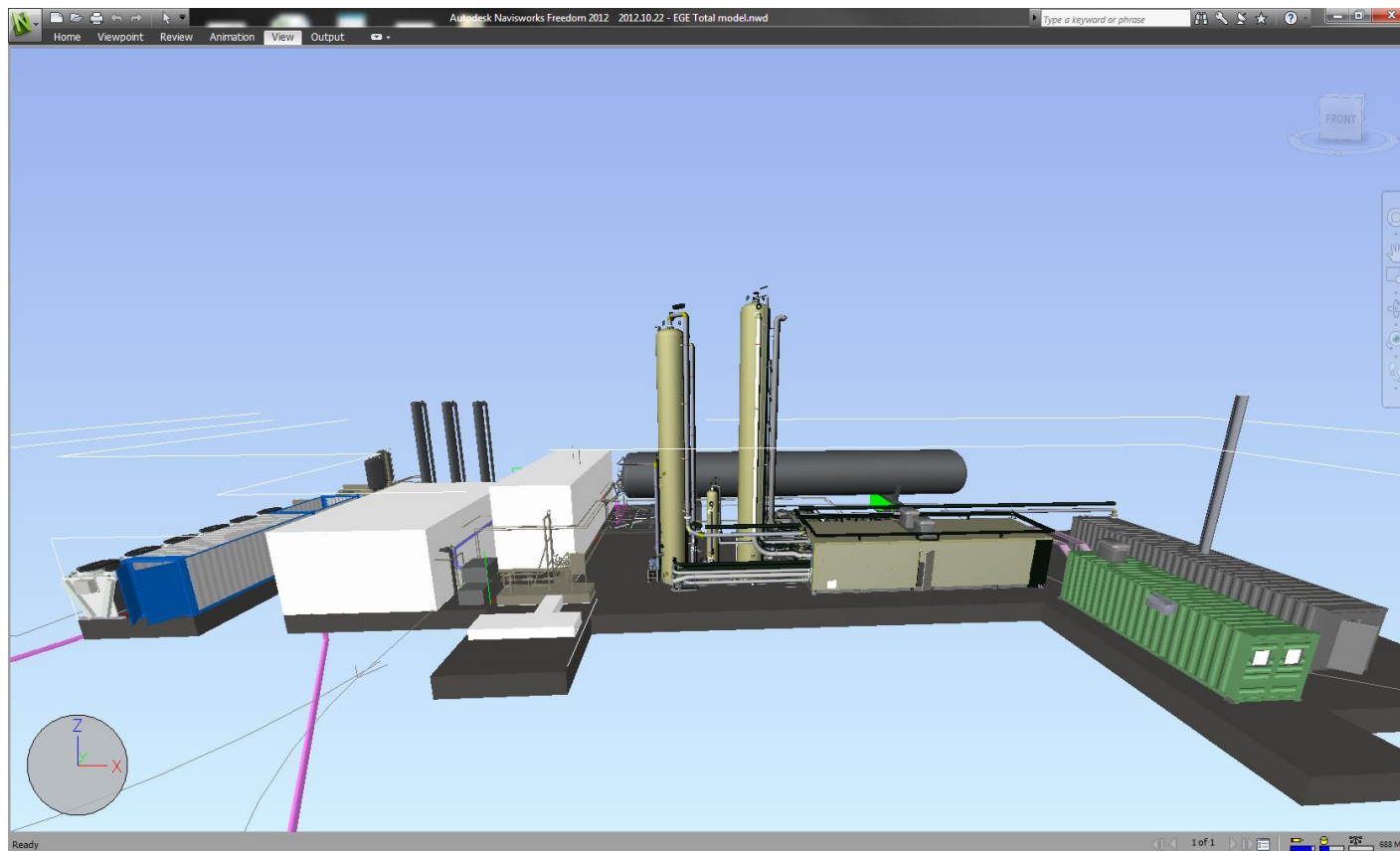


# From bio reactors to biogas: Upgrading

- Gas from reactors: 60 % methane and 40 % CO<sub>2</sub>.
- A **compressor** ensures stable and correct pressure and temperature before the gas is cleaned in a water scrubber = 97 % methane
- New **compressing and cooling process**, CO<sub>2</sub> adsorbing makes a 99 % methane gas = LBG (Liquid Biogas)



# LBG PLANT







# Biogas from RBA

## **DISTRIBUTION AND BUSINESS**

- Our client is the distributor AGA
- If overproduction: Gasflare, storing or utilizing as energy source at RBA

## **ENVIRONMENT**

- LBG fra RBA saves 12 000 t CO<sub>2</sub> emissions each year
- One kg food waste equals 0,13 l diesel fuel



# Bio Fertilizer Production

## 1) LIQUID

Liquid biowaste is sifted (solid: 4,5 %)  
ca. 90 000 m<sup>3</sup>

## 2) SOLID

Separation of liquid bio waste gives a  
solid organic material and is delivered  
as solid bio waste (15 000 t.) Ts app  
28%

## 3) CONCENTRATED

Liquid from separation is concentrated  
(12 000 m<sup>3</sup>) Ts 15%





# Bio fertilizer from RBA

## QUALITIES

- Essential nutrients (NPK)
- Liquid fertilizer easily adsorbed by ground
- Production: 90 000 m<sup>3</sup>/y

## STRATEGIES AND DISTRIBUTION

- Felleskjøpet Agri is sales agent
- Culture experiments over years

# Smell? Clean air?

## TECHNOLOGY

- Waste bunker: Interlock system
- Low pressure conditions

## AIR CLEANING SYSTEM

- Biological filter
- Liquid separator treatment of “smell”



THANK YOU

Oslo

