
# Coxabengoa and Biofuels. Rotterdam example

København, Danmark

24-25 October 2023

1 Key Data

2 Key suppliers

3 Plant byproducts

4 Coxabengoa biofuels


coxabengoa
Key data

1

## Footprint

23 Ha plant in Europoort (one of the world's busiest ports and entry to Europe), in Rotterdam

2

## Investment

550 M€ investment, over 30 different companies working, peaks of 1,500 manpower

3

## Storage

65,000 $m^3$ of new tank capacity in the Europoort area provided by Evos Rotterdam

4

## Largest facility

Works started in February 2008 and is the largest single facility in the world

5

## Process

From 1.2 Mt corn/wheat produces 480 Mlpy bioethanol + 0.36 MTpy DDGS + 0.3MTtpy $CO_2$.

6

## Why Rotterdam

The Netherlands big hub for ethanol blending, distribution (Rhine and Meuse rivers converge), and production, seaports provides easy access to feedstock and distribution to European and Northern countries

## 1 Grain reception and storage

Truck, train and vessel grain reception
**2 discharge lines each of 300 t/h**
**8 storage silos for cereal, each 9,603 m³**
(9,500m³ storage), with a 0.75 t/m³ density which represents 7,125 t cereal storage per silo, each silo equals 2 full days plant consumption.

## 2 Milling

5 + 1 (backup) hammer mills, each able to process 28 t/h (wheat) or 60 t/h (corn).

## 3 Fermentation

8 fermenters, 4,290m³ each (total capacity 34,320 m³) plus 2 beerwells 4,290m³ each, a total 8,580 m³ beer storage capacity.

## 4 Distillation

6 distillation columns

### Alcohol

#### Ethanol Storage

2 x 2,500 = 5,000 m³ tanks (approx.. 4 days production)

### Non-Alcohol

#### Centrifugate

6 + 2 (buffer) centrifugal decanters, with 61 t/h each capacity to obtain:
Cake → drying
Vinasses → evaporator

coxabengoa

5

## Centrifuges

6 + 2 (backup) centrifuge settler, each 61 t/h to obtain a cake to be processed on the drying and vinasse/stillage zone, from there to tank storage and the evaporator

## Stillage tank

1 vinasse tank

## Evaporator

process 162 t/h

## Clear stillage to recover water to be reintroduced in process

## Dark stillage

(syrup)

## Drying

3 dryers drum type 36 t/h each

## Pelletization

3 + 1 (buffer) pelletization machinery, 20 t/h each

## DDGS storage

9,000 $m^3$ capacity building (approx.. 5 days production).

# Utilities

| | |
|---|---|
| Electricity | Aeroderivative gas turbine 42 MW |
| Steam | Postcombustion recovery boiler producing 110 t/h + Gas conventional boiler 70 t/h. |
| Gas | Regulating and metering station designed for 38,800 $Nm^3/h$ + gas compressors. |
| Water | Water treatment plant to produce 770 $m^3/h$ filtered water and 83 $m^3/h$ demi water |
| Effluents | 31 $m^3/h$ aerobial effluents treatment plant |
| Cooling | Cooling tower 20,000 $m^3/h$ cold water (intake temp 37°C outlet 28°C) |

coxabengoa

1,200,000 tpy corn

480 Mlpy ethanol

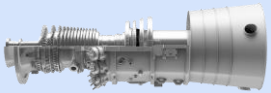
65 Ml stored in Europoort

360,000tpy DDGS

400,000tpy $CO_2$

gasunie

750,000 KWh year



# Key suppliers

## Bioethanol plant built in Rotterdam launched with great success

**Stolz has completed its work in the largest bioethanol plant in Europe. Since last April the new bioethanol plant, located in Rotterdam (The Netherlands), has been carrying out its production successfully.**

Stolz has carried out the design, management and "turnkey" project of this new bioethanol plant, belonging to Abengoa Bioenergy.

The annual production obtained from these plants is 480 million gallons of fuel using corn or wheat as raw material. It also generates more than 300,000 tons of DDGS, protein-rich food composition for cattle and their production of CO2 derived from the fermentation of sugars, which will be marketed for use in the greenhouse industry located in the port.

# Caldic Rotterdam expands tank storage capacity again

04.15.2010 - NEWS

**April 15, 2010 [Port of Rotterdam] - Caldic, which operates from the Europoort area, will expand its tank capacity substantially before the end of this year, to 112,500 m3. Recently, phase 1 (62,500 m3) went into operation. An important user of the tank park is neighbour Abengoa, which handles and stores bio-ethanol there.**

Phase 2 (50,000 m3) should become operational in the second half of the year. The plans for a third phase (37,500 m3) have already been developed. The tanks will be used not only for bio-ethanol, but also for the storage of ethanol.

# Caldic sells Europoort storage facilities to First State








Evos Rotterdam BV

Sitio web | Cómo llegar | Guardar

4.1 ★★★★☆ 9 comentarios de Google

Almacén, Puerto de Rotterdam, Países Bajos

**Dirección:** Merwedeweg 20, 3198 LH Europoort Rotterdam, Países Bajos

KATZEN INTERNATIONAL, INC.

coxabengoa

Home | Who We Are | What We Do | Projects | News & Events | Contact Us

- Projects Showcase
- Under Design and Construction
- KATZEN VHQ™ Distillation
- Cellulosic Technology
- Constructing AGRANA (slide show)


## Abengoa Bioenergy Netherlands

Located in busy Europort near Rotterdam, Netherlands, Abengoa Bioenergy Netherlands (ABN) began start-up and production in 2010. The location of the facility at an international port allows for ease of access to the world grain market. The plant, designed to produce 480 million liters per year of industrial (fuel) grade ethanol, is the largest multi-feedstock (wheat and corn) fuel

VEOLIA

Veolia Water Technologies North America

About | Solutions | Publications | Latest

Companies › Veolia Water Technologies North America › News › HPD Awarded Design-Build Project for Abengoa Bioenergy in ...

## HPD Awarded Design-Build Project for Abengoa Bioenergy in Rotterdam, The Netherlands

☆☆☆☆☆ 0

SHARE

Jun. 25, 2008

Source: Veolia Water Technologies North America

BILBAO, Spain, June 23, 2008 – HPD has been awarded the design-build project for the evaporation system for Abengoa Bioenergy's new bioethanol plant in the port of Rotterdam in the Netherlands. The new facility will produce 480 million litres (126 million gallons) renewable fuel per year and will be one of the single largest production sites in Europe.

The stillage evaporation system supplied by HPD will concentrate the co-product stream as a crucial part of removing water from the stillage produced from bioethanol production. The system is comprised of a three-effect falling film evaporation train followed by a high-solids concentration unit. The overall system will efficiently produce up to 35% TS (total solids) prior to final water removal in the grain drying unit.

The HPD system features enhanced forced circulation evaporation that allows higher solids concentration with minimal fouling even with the high viscosity experienced with the processing of stillage. This proprietary technology increases heat transfer efficiency while reducing power consumption when compared to standard forced circulation designs.

# Plant byproducts

# From grain…

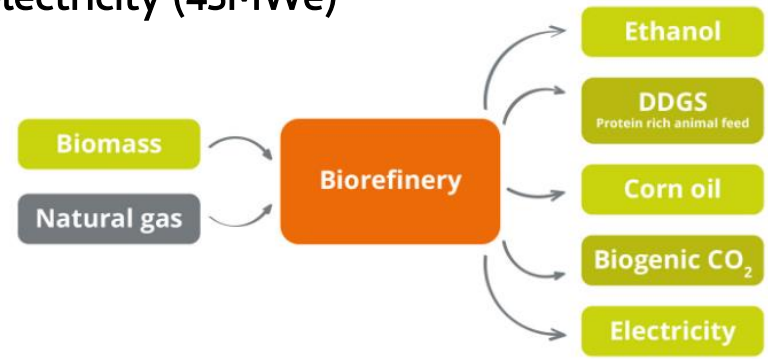
## The plant produces…

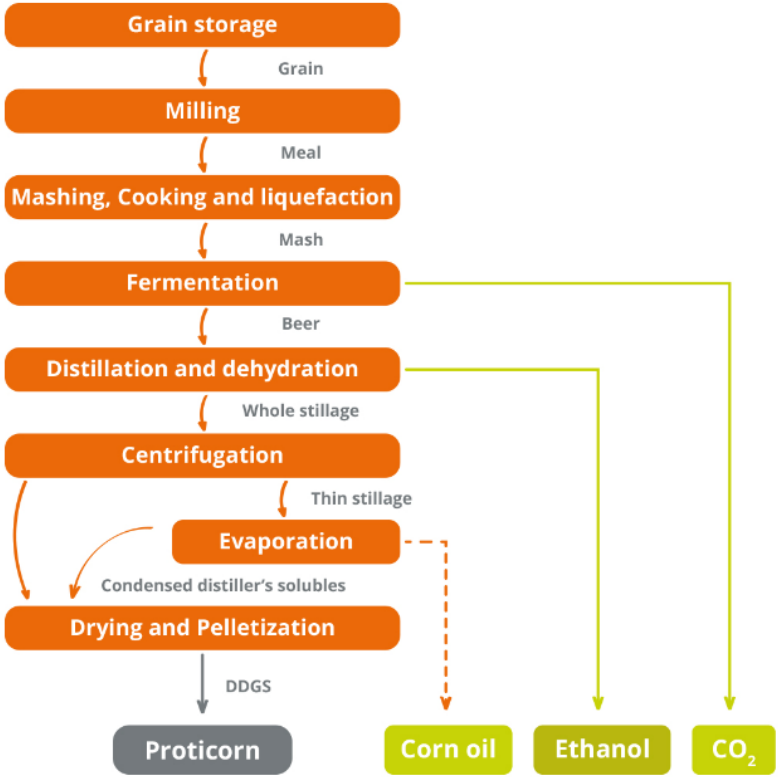
**DDGS** (Distillers' Dried Grains with Solubles) contains about three times as much protein as the grain used. It is sold as pellets to the animal feed industry (dairy and beef cows, pigs and poultry).

**Corn Oil**. During the evaporation of the thin (residual) stream, after pre-treatment, the corn oil is separated using a centrifuge.

**Ethanol**. The process uses the sugar in the corn to convert it into alcohol.

**$CO_2$ and electricity (45MWe)**



# $CO_2$ OCAP

**Organic Carbon dioxide for Assimilation of Plants** (OCAP) supplies pure $CO_2$ by pipeline from industry in the Rotterdam port area (among which is Coxabengoa's plant in Europoort) to greenhouses north of the port (Westland) and others. Coxabengoa plant was connected up to OCAP network as a second $CO_2$ source in 2010 to increased OCAP supply capacity by a third to around 400.000 tons of $CO_2$ per year provided only by the bioethanol facility.


coxabengoa

The plant is one of the few European ethanol plants that captures and re-uses $CO_2$ (Carbon Capture and Utilization, CCU) produced during the corn fermentation process; the system is managed by OCAP and Linde, purifying and compressing this $CO_2$ in am amount of 400,000 tpy of green $CO_2$, through the OCAP pipeline to the Westland where it is used in the horticultural sector. In the greenhouses the fossil $CO_2$ extracted from natural gas is replaced by this green $CO_2$. **This $CO_2$ is absorbed by the tomatoes and peppers stimulating the growth process**

Using $CO_2$ in an environmentally friendly way also reduces the $CO_2$ footprint of bioethanol, as this capture and re-use of $CO_2$ makes greenhouse gas emissions far below the EU average.


coxabengoa
Coxabengoa biofuels

York NE, 95 Mla
Colwich KS, 210 MLa
Portales NM, 115 MLa
Ravenna NE, 335 MLa (2007)
Evansville IN, 335 MLa (2010)
Tricity IL, 335 MLa (2010)

San Roque (Spain, 2009) 250 MLa
Cartagena (Spain, 1999), 150 MLa
Salamanca (Spain, 2006), 200 MLa
Coruña (Spain, 2001), 190 MLa
Lacq (France, 2007), 250 MLa
Rotterdam (Netherlands, 2010) 480 MLa

Sao Luiz, 91MLa
Sao Joao, 85MLa

# 14 references in 1G in the 3 main biofuels hubs: USA, Brazil and Europe

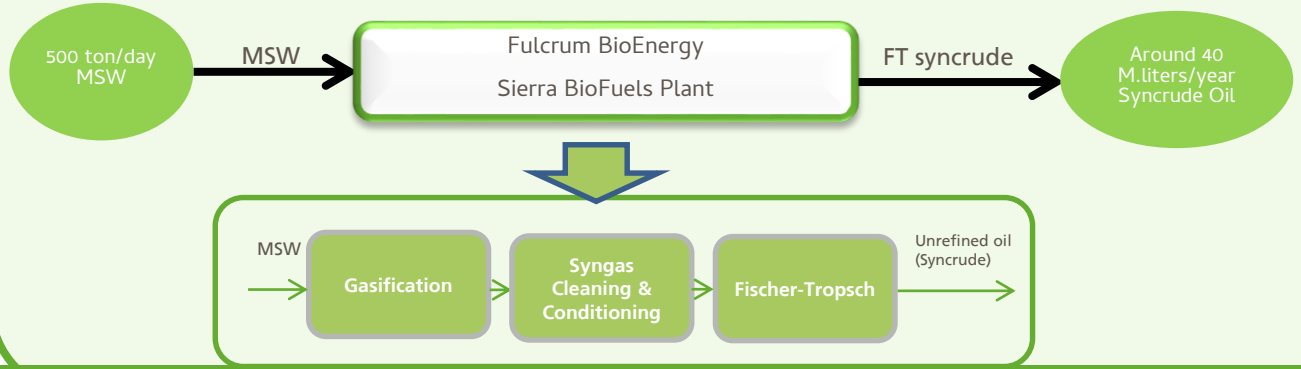
# Waste to Fuels

First project of Waste to jet fuel developed: **Fulcrum Project** (Nevada, USA)

coxabengoa

Fulcrum BIOENERGY


Abengoa has develop the engineering, optimization, integration as well as procurement and construction of the first of a kind plant to convert MSW into jet fuel. First approaches of plant design since 2015.




The experience in Fulcrum has allowed acquiring specific engineering capabilities in this type of projects and to stablished relation with main suppliers in the field.

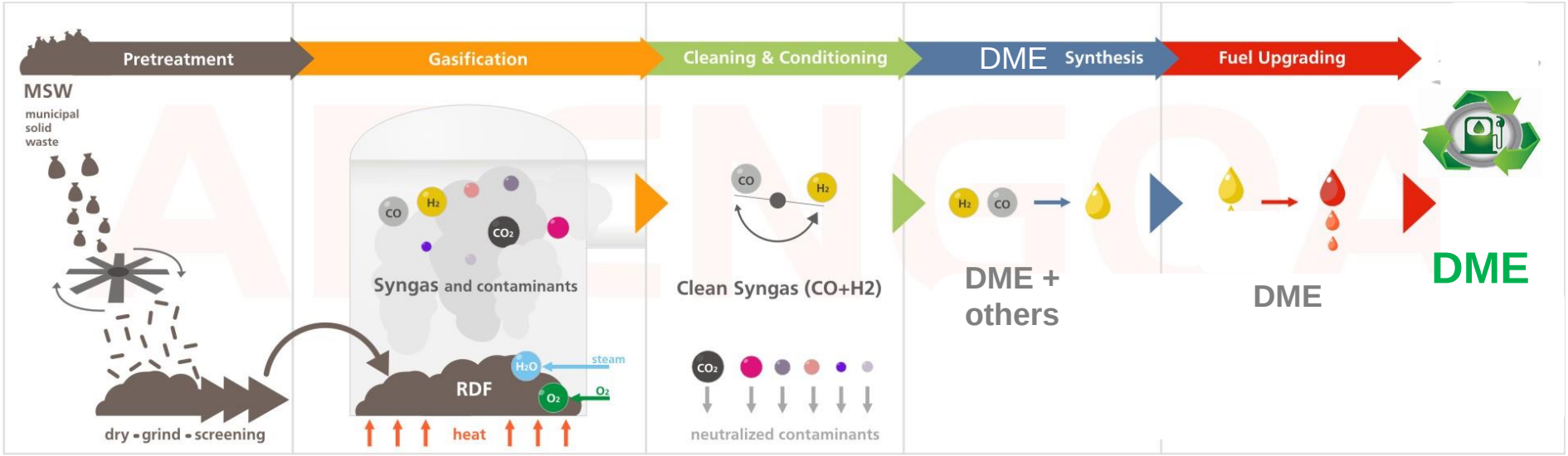
TRI · Johnson Matthey · ARVOS GROUP · Axens · jord · HALDOR TOPSOE

# Waste to Fuels

KEW TECHNOLOGY Circular Fuels Ltd

coxabengoa

Current project under development: Waste to renewable and recycled carbon DME (low-carbon LPG substitute) plant (UK)

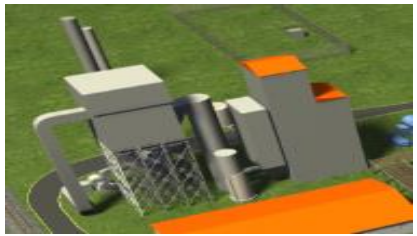


# Waste to Fuels

KEW TECHNOLOGY Circular Fuels Ltd

coxabengoa

## Projects in development: **The Scope of Abengoa**



**Demonstration plant 5 dtpd (Birmingham, UK)**

Developing the basic and detail engineering

**Commercial plant 150 dtpd (Teesside, UK)**

Feasibility and Conceptual Engineering:
Process package definition
Integration of the main process areas
Technologists and vendors analysis
Technical supervision
Definition of requirements and supplies

KEW TECHNOLOGY

- DME Synthesis
- DME Purification

Circular Fuels Ltd

- Feedstock handling
- Gasifier
- Cleaning system
- Flare
- Storage
- Utilities


# Tak skal du have!

jm.casablanca@coxabengoa.com