# CIAA strategy and best practice example in the food sector

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# Who is CIAA ?

- Confederation of the Food and Drink Industries in the EU
- Largest manufacturing sector in the EU (turnover **€ 954 billion**)
- **288 000** food and drink **companies (99.1 % SMEs)**
- Provides direct employment to **4.2 million people**
- Purchases **70% of EU agricultural produce**
- Net exporter of food and drinks outside EU (**€ 53.7 billion exports**)
- **CIAA Members:**
  - 26 national food industry federations
  - 26 European sub-sectors
  - 20 major companies

# British Sugar Group is part of Associated British Foods & a member of CEFS

- **Associated British Foods is a diversified international food, ingredients and retail group with sales of £10.2 billion and over 97,000 employees in 44 countries.**

- **British Sugar Group produces sugar and other products in many geographical locations**
  - In UK, British Sugar plc produces over one million tonnes of sugar from beet.
  - In Spain, Azucarera manufactures 400k tonnes of sugar from beet and has a further capacity of 400k tonnes of sugar from cane.
  - Chinese operations total 850k tonnes of sugar from both beet and cane.
  - Illovo, in southern Africa, has an annual cane sugar production of 1.9 million tonnes of sugar

# At a glance

## the EU food and drink industry in 2009

| Turnover | Employment | SMEs[1] |
|---|---|---|
| **€954 billion** (-4.0% compared to 2008) Largest manufacturing sector in the EU (12.9%), ahead of the automobile and chemical industries | **4.2 million people** (-1.5% compared to 2008) Leading employer in the EU (13.5%), ahead of the fabricated metal, machinery & equipment industries | **48.2%** of food and drink turnover **62.8%** of food and drink employment |

| External trade | Number of companies | Value added (% of EU GDP) | Consumption (% of household expenditure) |
|---|---|---|---|
| **Exports €53.7 billion** (-8.0% compared to 2008) **Imports €50.8 billion** (-14.2% compared to 2008) **Trade balance €3.0 billion** Net exporter of food and drink products | **288,000**[2] Fragmented industry | **2%** Stable | **13.1%** Slight increase |

| EU share of global exports | R&D (% of food and drink output) |
|---|---|
| **18.6%** (20.4% in 2000) Shrinking share in global exports | **0.37%**[3] Insufficient R&D expenditure |

(1) 2007 data
(2) 2008 data
(3) 2006 data

# Sustainability – in the heart of our business

- The EU food industry purchases **70% of EU agricultural produce**
- The EU food industry is **the largest agricultural importer** in the world

**Therefore:**

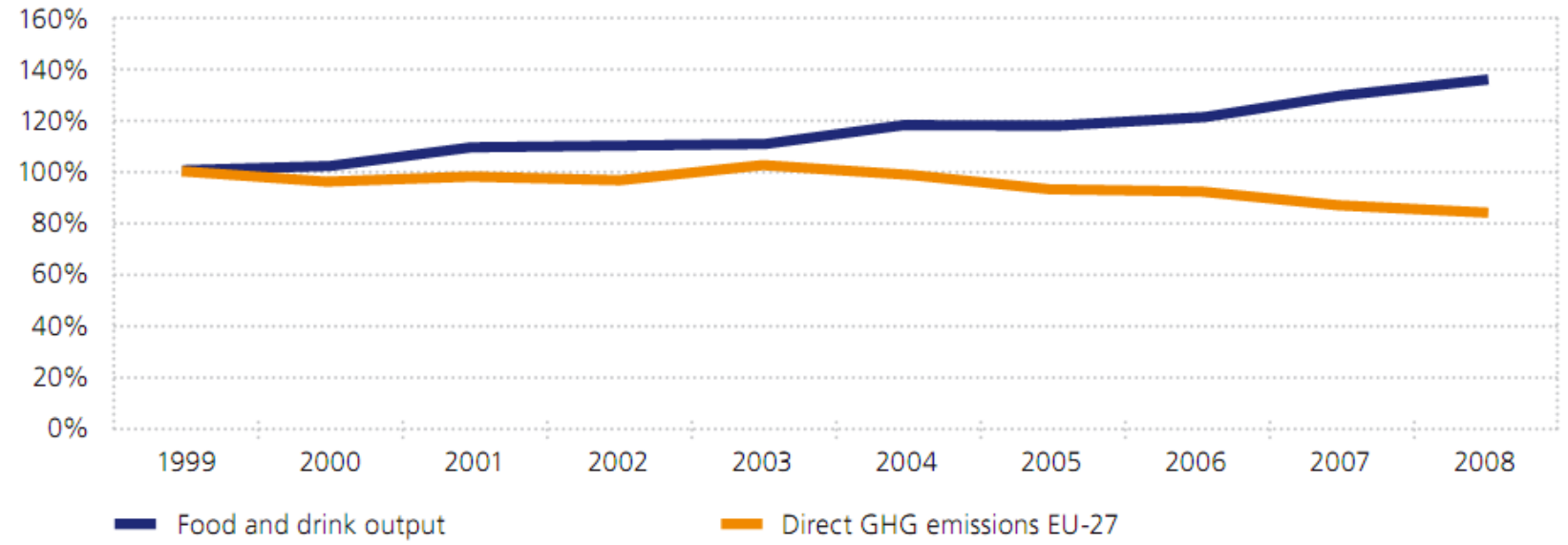
- The industry needs a **stable supply of high quality raw materials**
- The first objective of the industry is to use **100% of its agricultural resources** wherever possible

# Food & Drink Industry: The Issue

- Food and drink manufacturing is characterised by relatively low energy intensity, although major differences in energy intensities between the various sub-sectors
- Food and drink manufacturing requires process heating and cooling, as well as electric power
- GHG emissions from food and drink manufacturing are almost exclusively energy use related (> 99%). Process emissions in the industry are very low
- The EU food and drink manufacturing industry directly accounts for about 1.5% of total EU GHG emissions

# Continuous Industry Commitments

Fig. 17 **Evolution of GHG emissions in the EU food and drink manufacturing industry (1999=100)**




EU-15 1999-2004, EU-25 2004-2007, EU-27 2007-2008
Direct GHG emissions from the EU food and drink sector: -17% since 1999
Food and drink output: +35% since 1999

Source : EEA, Eurostat, 2008

# Food & Drink Industry: Investments in low carbon technology

- Consider energy efficiency in long-term investment decisions
- Explore further potential for co-generation (CHP), tri- and poly-generation, and other technologies
- Move towards renewable and low carbon energy sources (supply side)
- Increased on-site generation of low carbon energy (e.g. bio-gas production from by-products, use of by-products as renewable fuel in combustion plant,…)

***Energy efficiency and carbon management are important drivers for increased industrial competitiveness and improved environmental sustainability***

# Advantages of CHP use in the Food & Drink Industry

- Food industry facilities have a significant demand for heat (and cooling)
- The best way to provide the heat is from a CHP plant as this provides maximum PRIMARY energy saving opportunities to the economy.
- Can be designed to provide fuel flexibility.
- Can be designed to use by-products as renewable fuels thus producing:
  - Renewable electricity

  and
  - Renewable HEAT
- Relieving congestion on local electricity grid to the benefit of the region
- Can provide high power reliability and self-sufficiency
  - Especially as major primary food production facilities are located in rural areas with poor infrastructure.

# CHP Case Studies
# in the Food & Drink Industries.
# Review the CODE website and...

Case study factsheet
Northern region, Belgium

**Belgomilk Langemark**

Food and beverage

*Main CHP plant indicators*

| | | |
|---|---|---|
| Electrical capacity (total) | $MW_e$ | 7,35 |
| Heat capacity (total) | $MW_{th}$ | 13,8 |
| Technology | Gas turbine | |
| No. of units | 1 | |
| Manufacturer | Turbomach | |
| Type of Fuel | Natural gas / Biogas | |
| Electricity: yearly generation | GWh | 57,3 |
| Heat: yearly generation | PJ | 0,43 |
| Year of construction | 2009 | |
| Total investment costs | EUR | 7.000.000 |
| Financing | Own founds<br>Loans | |
| State support | Investment subsidy<br>Certificates | |
| Location | B-8920 Langemark, Belgium<br>www.belgomilk.be<br>Staf Camforts, Milcobel cvba<br>Phone: +32 (057) 490 200<br>staf.camforts@milcobel.com | |

*General description of the case*

The CHP plant consists of a Solar/Turbomach natural gas turbine with generator type Taurus 70. The heat of the exhaust gases is lead trough a waterpipe heat recovery boiler to produce 25 tons/h steam at 22 barg (incl. Additional firing). The CHP plant is mostly full load driven, but partial load is possible. The main benefits are a reduction of 5150 tons/year $CO_2$ production and a primary energy reduction of 19,35%.

The generated heat is used as steam for 100% for the dairy plant (Milk Powder, Butter, Cheese, Whey products and Ice Cream production).

The generated electricity is used for 85% for the dairy plant; 15% is injected to the public grid (sold to a power supplier).

*Picture*

*Success factors*

The main success factors are:

- Primary energy reduction of 19,35%
- $CO_2$ reduction of 5150 tons/year
- The CHP certificates
- Lower total price of the power because of the local production (no transport costs)

*Main barriers*

The main barriers are:

- Price of natural gas
- Price of the electric power

*Recommendations*

In view of local consumption of the electric power there is also need for support by the allotment of CHP certificates to make a project profitable.

Intelligent Energy Europe

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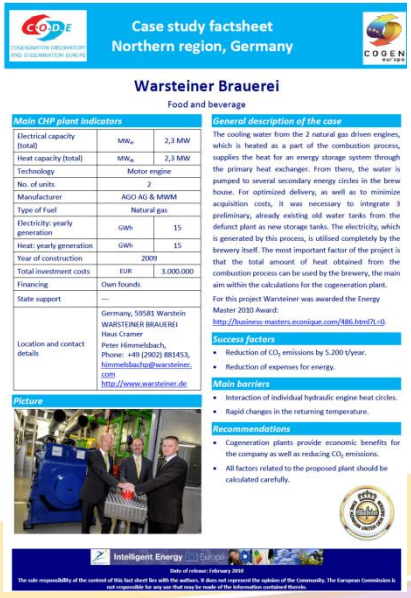

Case study factsheet
Northern region, Germany

**Warsteiner Brauerei**

Food and beverage

*Main CHP plant indicators*

| | | |
|---|---|---|
| Electrical capacity (total) | $MW_e$ | 2,3 MW |
| Heat capacity (total) | $MW_{th}$ | 2,3 MW |
| Technology | Motor engine | |
| No. of units | 2 | |
| Manufacturer | AGO AG & MWM | |
| Type of Fuel | Natural gas | |
| Electricity: yearly generation | GWh | 15 |
| Heat: yearly generation | GWh | 15 |
| Year of construction | 2009 | |
| Total investment costs | EUR | 3.000.000 |
| Financing | Own founds | |
| State support | --- | |
| Location and contact details | Germany, 59581 Warstein<br>WARSTEINER BRAUEREI<br>Haus Cramer<br>Peter Himmelsbach,<br>Phone: +49 (2902) 881453,<br>himmelsbachp@warsteiner.com<br>http://www.warsteiner.de | |

*General description of the case*

The cooling water from the 2 natural gas driven engines, which is heated as a part of the combustion process, supplies the heat for an energy storage system through the primary heat exchanger. From there, the water is pumped to several secondary energy circles in the brew house. For optimized delivery, as well as to minimize acquisition costs, it was necessary to integrate 3 preliminary, already existing old water tanks from the defunct plant as new storage tanks. The electricity, which is generated by this process, is utilised completely by the brewery itself. The most important factor of the project is that the total amount of heat obtained from the combustion process can be used by the brewery, the main aim within the calculations for the cogeneration plant.

For this project Warsteiner was awarded the Energy Master 2010 Award:
http://business-masters.econique.com/486.html?L=0.

*Success factors*

- Reduction of $CO_2$ emissions by 5.200 t/year.
- Reduction of expenses for energy.

*Main barriers*

- Interaction of individual hydraulic engine heat circles.
- Rapid changes in the returning temperature.

*Recommendations*

- Cogeneration plants provide economic benefits for the company as well as reducing $CO_2$ emissions.
- All factors related to the proposed plant should be calculated carefully.

*Picture*

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Case study factsheet
Northern region, Belgium

**Spa Monopole**

Food and beverage sector

*Main CHP plant indicators*

| | | |
|---|---|---|
| Electrical capacity (total) | $MW_e$ | 2 |
| Heat capacity (total) | $MW_{th}$ | 2,4 |
| Technology | Motor engine | |
| No. of units | 1 | |
| Manufacturer | Cummins | |
| Type of Fuel | Natural gas | |
| Electricity: yearly generation | GWh | 16 |
| Heat: yearly generation | GWh | 19 |
| Year of construction | 2008 | |
| Total investment costs | EUR | 2.600.000 |
| Financing | Own funds | |
| State support | Certificates | |
| Location | Spa Monopole<br>Spa, Belgium<br>www.spa.be<br>Benjamin Devis<br>benjamin.devis@vranparijs-maes.be<br>+32 473 944 333 | |

*General description of the case*

'Spa' is a modern term for a health resort. The name originates from a small town in the Belgian Ardennes that was already frequented for its healing hot springs as early as the 14th century. It is also a location where the famous Belgian mineral water brand 'Spa' is bottled by Spa Monopole.

Because the quality of their product is directly related to the quality of the environment, Spa Monopole has an environmentally friendly policy.

To increase their energy efficiency, Spa Monopole asked for help Belgian experts in cogeneration technology 'VMI Contracting & Engineering'. A 2 $MW_e$ natural gas engine was installed producing electricity, steam and hot water.

*Success factors*

A stable and renowned Belgian certificate system is of course a big driver of green investments in Belgium. Often underestimated by foreign management, the Belgian certificate system is amongst the most reassuring green subsidies for industrial projects in the EU.

The orientation towards a sustainable energy management of the Spa Monopole enterprise was also a reason why the whole team was ready to make a switch from consumer to prosumer. With their CHP installation they now save up to 37,6 % of $CO_2$ emission.

On the other hand Spa Monopole chose the right partner, independent of any brand or supplier, to take on the project from the very beginning to its end. VMI has engineered and installed more than 25 installations like this – together with their full maintenance – independently of any brand. Spa Monopole could count on the best solution from a technical, financial and service point of view, because the performances that were engineered are guaranteed for as long as the service contract goes. VMI can offer also third party financing for these projects, an option that Spa Monopole didn't have to take.

*Picture*

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Case study factsheet
Northern region, Ireland

**Bailieboro CHP plant, Lakeland Dairies**

Food and beverage

*Main CHP plant indicators*

| | | |
|---|---|---|
| Electrical capacity (total) | $MW_e$ | 5 |
| Heat capacity (total) | $MW_{th}$ | 18,5 |
| Technology | Gas turbine & Waste heat recovery boiler (WHRB) | |
| No. of units | 1 | |
| Manufacturer | Centrax – Gas turbine<br>Wuhl – WHRB | |
| Type of fuel | Natural gas | |
| Electricity: yearly generation | GWh | 30 |
| Heat: yearly generation | GWh | 115 |
| Year of construction | 2009 | |
| Total investment costs | EUR | 6,3 M |
| Financing<br>Energy Service Company (ESCO) | Dalkia Alternative Energy<br>Contracting by Dalkia Alternative Energy Ltd – Own funds | |
| State support | None | |
| Location | Lakeland Dairies, Bailieborough, Co Cavan, Ireland<br>www.lakeland.ie | |

*Pictures*

*Internal view*

*External view*

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# Kellogg's Manchester, UK - CHP Operation

- 4.9Mwe Combined Heat and Power Plant
- Supplies 85% of current steam demand and approximately 50% of electricity demand
- Fuel source natural gas
- Uses Best Available Technique under BREF
- Generate 11 kV - directly fed onto Kellogg's 6.6kV distribution network
- Waste heat passed through a HRSG producing steam at 10barg and 20te/hr maximum output capacity
- Dry Low Emission Abatement Technology

# Kellogg's Manchester, UK - CHP Operation

- **Achievements**
  - Reduced CO2 emissions by c12%
  - Emits less NOx
- **Challenges**
  - Balancing steam & electricity requirements
  - Neither steam or electricity is exported
  - No back up fuel for use in the CHP
  - Operated by contractors – 2 EU ETS permits interactions/managing with UK legislation - climate change agreement
- **Future policy**
  - Not to be financially penalized for investing and operating CHP
  - Need to assess the balance between energy prices – sharp gap
  - Assessing feasible CHP at all EU manufacturing sites

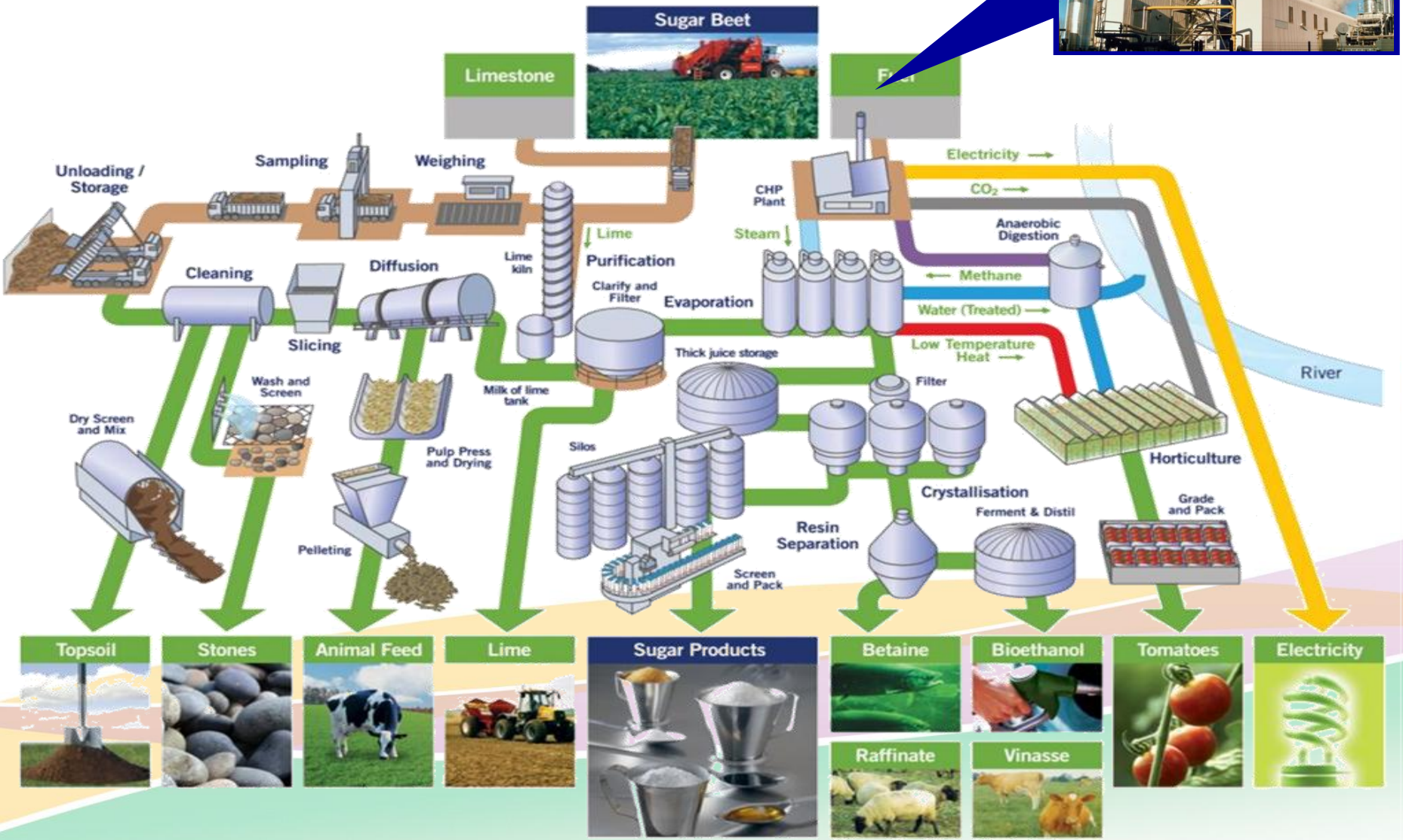
# Nestlé NESCAFÉ: Co-generation of spent coffee grounds

Nestlé has been implementing spent coffee grounds fueled boiler technology for the last 30 years, and of the 27 coffee factories where spent coffee grounds are a by-product, 21 are equipped with such technology. In some of them spent coffee grounds are also used to generate renewable electricity.

***Co-generation plant at Mainz coffee factory, Germany, where spent coffee grounds are used as fuel***

***This technology improves carbon footprint of* NESCAFÉ *by substituting fuel oil with renewable biomass.***

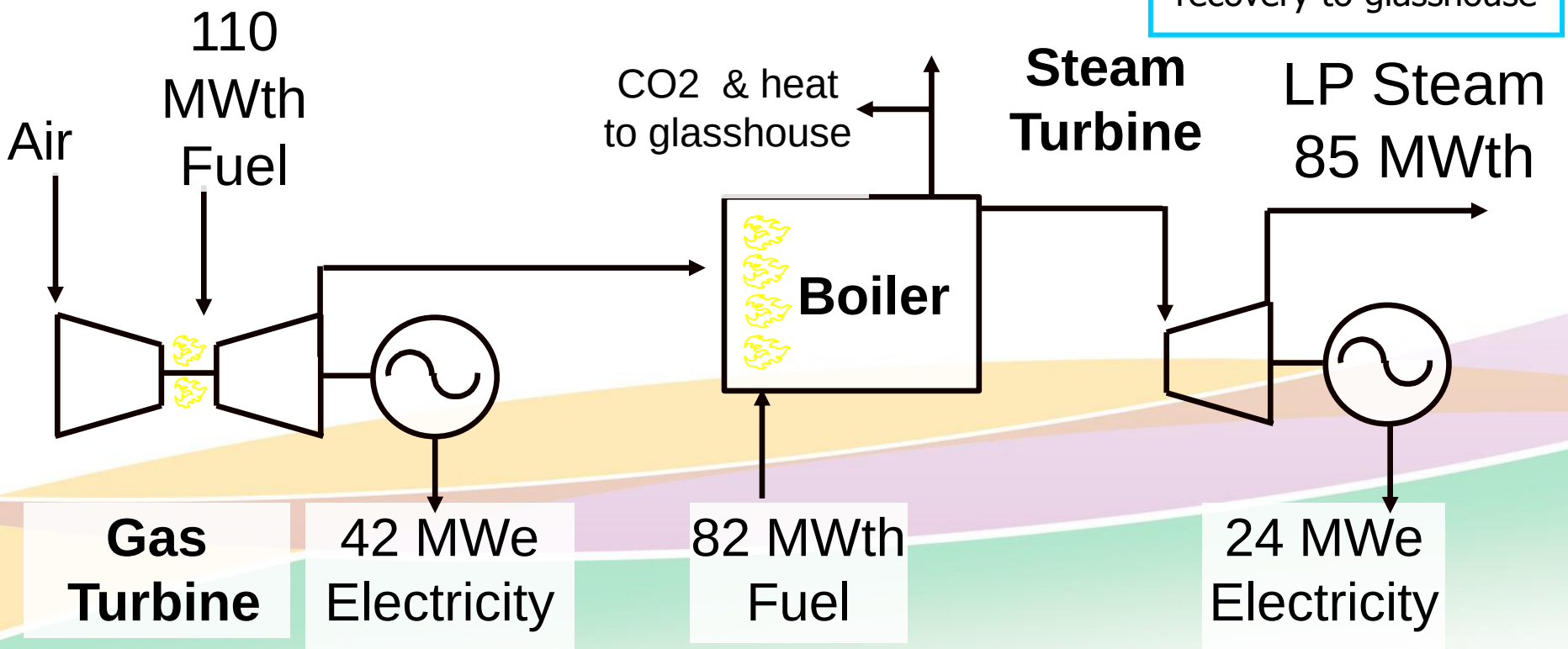
# CHP, the heart of the bio refinery...



# Gas Turbine Based CHP at British Sugar Factory Wissington, UK

$$\text{Efficiency} = \frac{\text{MW (Out)}}{\text{MW (In)}} = \frac{(42+24+85+8)}{(110+82)} = 82.8\%$$

Including 8 MW heat recovery to glasshouse



# Confectionary: Tangerine ENER-G

- Tangerine owns sugar  confectionary brands such as:
  - Barratt,
  - Lion,
  - Mojo,
  - Wilkinson's B
  - Butterkist

- Achieved savings on energy thanks to cogeneration and trigeneration technologies from sustainable engineering group ENER-G

- Installing energy efficient combined heat and power (CHP) systems at its Pontefract production site in West Yorkshire

- Cost savings of almost £200,000 and save 630 tonnes of carbon

- Utilised ENER-G's discount energy purchase scheme which entails no capital outlay for the business

# Dairy Products: Adams Food ENER-G

- UK's leading pre-packed cheese business
  - 30% share of UK retail market
- Great carbon performance thanks to CHP technology
- Since June 2010 it achieved carbon savings of 476 tones
- The CHP system generates
  - 150kW of electricity
  - and provides 225kW of heat to per-heatwater for washing and cleaning

# Barriers to increased use of CHP

- **Investment aspects:**
  - Risks higher compared to boiler or power from grid
  - Targeted support available however varied across MS, and not sufficient to establish maximum CHP capacity

- **Technical aspects:**
  - Lack of technical understanding:
    - Addressed through for example the CODE project
  - Availability of fuel sources (biomass, biogas and natural gas)
  - Connection to electricity & natural gas networks can be difficult

# Policy recommendations for further improvement

- Ensure Member State implementation of the Cogeneration Directive
- Financial support schemes & incentives to overcome existing barriers
- Upcoming Energy Savings Directive & National Energy Efficiency Action Plans to promote its use
- Increased support to SMEs
- Further spread of best practices across industry, particular attention to SMEs
- The need for long-term strategies and certainty from policymakers

# Thank you for your attention!