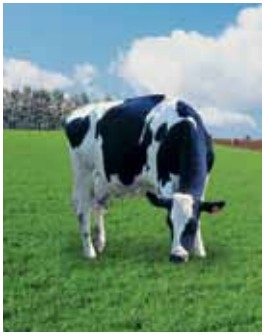
BRITISH SUGAR

about Wissington factory



welcome to Wissington factory

This short guide is designed to give you an overview of the workings of one of Europe's most efficient sugar factories. We hope you find it informative and engaging.

Paul Hitchcock

Paul Hitchcock, Factory Manager

How a British Sugar factory operates

The diagram on the centre pages shows how all of the processes at Wissington are integrated. The basic sugar production process is the core, but the additional steps show how **Wissington produces much more than sugar.**

The output of each process becomes the input of the next, until raw materials are turned into products avoiding unnecessary waste.

A good example of this sustainable approach is the Horticulture business, where the combustion gases from the power station and low grade heat are diverted away from emissions to air and are instead used to enrich the environment inside a glasshouse to encourage tomatoes to grow twice as fast as normal.

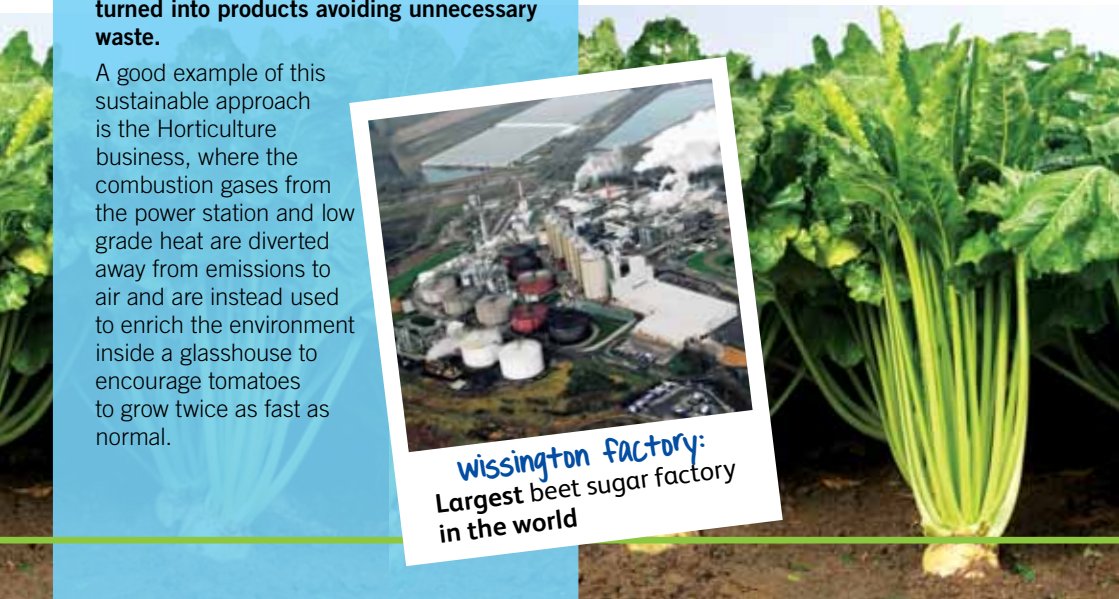
Homegrown sugar beet

Over three million tonnes of sugar beet are produced by some 1,200 local growers, at an average distance of 28 miles from the factory.

Beet samples are analysed in a central tarehouse at Wissington, which also serves all of British Sugar's factories.

The first stage of processing involves cleaning the sugar beet. Soil is separated, dried, screened and blended before being sold as high quality topsoil, under the TOPSOIL brand, to landscapers and for construction projects.

In addition, rotary stone catchers remove 5,000 tonnes of stone each year, which is washed and sold as an aggregate.



Wissington factory:
Largest beet sugar factory in the world

Extraction and animal feed

Clean beet is sliced into thin strips called cossettes. These are pumped to three separate diffusers where they are mixed with hot water to extract the sugar. The juice is used to preheat the cossettes before passing to heat recovery systems and on to purification.

The remaining fibre is mechanically pressed before being dried in gas fired rotary driers. This process produces the familiar plume of steam rising from the drier chimney during the winter months.

The dry fibre is compressed into pellets which are sold in bulk as animal feed. **Over 140,000 tonnes of dried animal feed are produced and sold each year.**

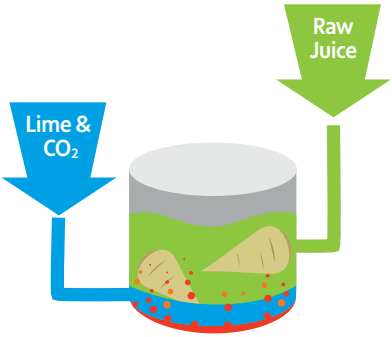
> **"Wissington produces much more than sugar"**

Purification

The raw juice is progressively heated through complex heat recovery systems, which minimise the energy demand of the plant. Milk of lime and CO_2 are added to precipitate calcium carbonate or chalk, which removes the impurities in the raw juice.

The extracted 'thin juice' passes through multiple effect evaporators which boil the water off and produce a syrup known as 'thick juice'.

This is the complex heart of the factory's energy efficiency. The water that has been removed by evaporation is used for further heating and then stored to be used in other processes on site.



Crystallisation

Up to 50% of the thick juice which is produced can be stored in ten large steel tanks with **a combined capacity of 365,000 tonnes.** This juice is returned to the factory after beet processing to allow crystallisation to continue throughout the year.

Crystallisation takes place in vacuum pans which boil the juice at relatively low temperatures under vacuum. The thick juice is 'seeded' with tiny sugar crystals to provide the nucleus for crystals to form and grow.

When the crystals reach the desired size the mixture of crystal sugar and syrup, known as massecuite, is spun in centrifuges to separate the sugar from the 'mother liquor'.

After the sugar crystals are washed, dried and cooled, they are conveyed to seven concrete storage silos, with **a total bulk capacity of 97,000 tonnes.**

Wissington factory:
Most efficient in Europe

how our factory operates

We aim to transform raw materials into sustainable products.

Beet supplies

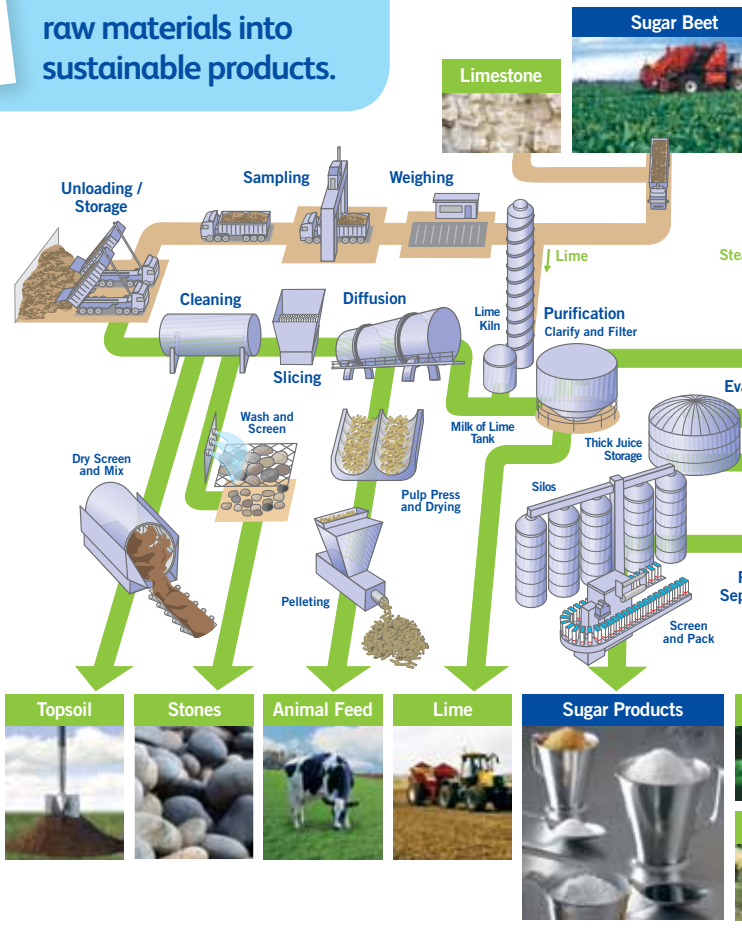
- 3 million tonnes of beet is delivered at an average distance of 28 miles from the factory.
- 1,200 UK growers.

Purification

- First purification where milk of lime and CO_2 are added to precipitate calcium carbonate or chalk.
- Precipitated chalk is filtered, washed and pressed, producing 800 tonnes of LimeX per day.

Crystallisation

- Crystallisation takes place in vacuum pans which boil the juice at relatively low temperatures.
- Juice is 'seeded' with tiny sugar crystals to provide the nucleus for crystals to form and grow.



TOPSOIL

- 150,000 tonnes sold each year, with 50,000 tonnes under the TOPSOIL brand.

Stones

- 5,000 tonnes of stone cleaned and sold as aggregate each year.

Animal feed

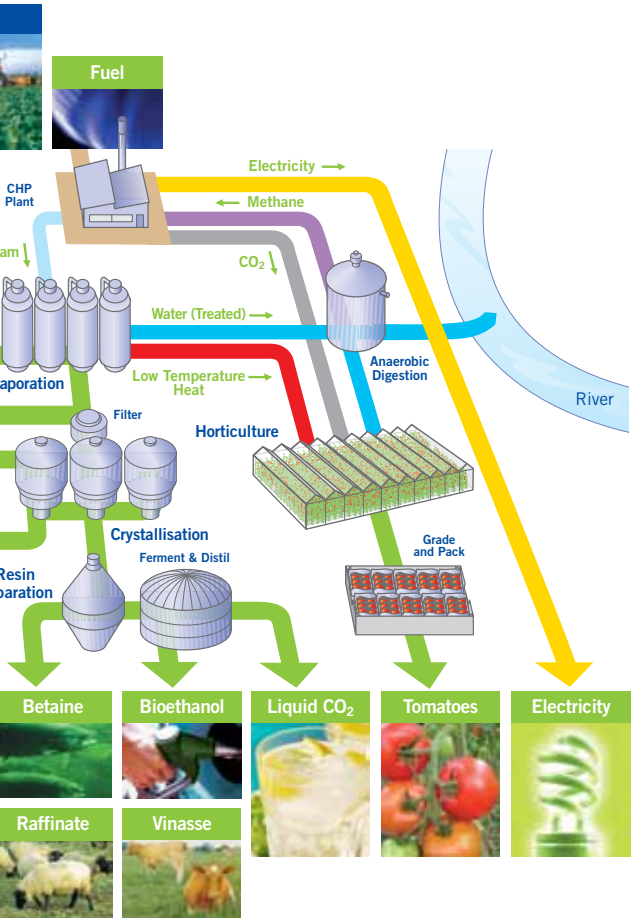
- Over 140,000 tonnes of dried animal feed are sold each year.

LimeX

- Over 120,000 tonnes of LimeX produced and sold annually.

Sugar products

- Wissington supplies 420,000 tonnes of sugar to food and drink manufacturers in the UK and across Europe.



Resin separation

- Residual syrup, together with syrup from other factories, is passed through a resin separation process.
- Three products are produced: a sugar stream called extract; an amino-nitrogen stream which is mainly betaine; and a further stream, raffinate.

Liquid carbon dioxide

- A carbon dioxide recovery and liquefaction plant recovering up to 70,000 tonnes of carbon dioxide per year from the Bioethanol fermentation processes.

Horticulture

- UK's largest grower of classic round and speciality salad tomatoes.
- Glasshouse covers an area of 18 hectares and produces around 140 million 'eco-friendly' tomatoes per year.

Power generation

- Over 50 MW can be exported into the local electrical grid.
- Enough for a population of 120,000 people.
- Achieves the best CHP rating under the Government's CHP Quality Assurance (CHPQA) programme.

Bioethanol

- A fermentation/distillation plant producing up to 55,000 tonnes of Bioethanol per year.
- This is used as a renewable fuel to blend with petrol.
- First UK Bioethanol fuel plant. Received the award for Best New Project in 2007 from the Renewable Energy Association.

Resin separation

After crystallisation, the residual syrup, together with the syrup from other factories, is passed through a resin separation process. Three products are produced: a sugar stream called extract; an amino-nitrogen stream which is mainly betaine; and a further stream, which is mainly mineral salts, and is called raffinate.

The betaine liquid is sold as an animal feed supplement which increases the feed absorption efficiency in the animals' digestion system. Betaine can also be used as a moisturiser in healthcare and cosmetic products. **Wissington is the largest producer of natural betaine in the world.**

The raffinate is used also with beet fibre in animal feed production. The sugar extract may be used to crystallise sugar or is passed to the Bioethanol plant where it can be used in the fermentation substrate.

Wissington factory:
Largest producer of betaine **in the world**

Horticulture

British Sugar's award-winning horticulture business produces around **140 million 'eco-friendly' tomatoes each year at Cornerways Nursery.** A quarter of a million plants are grown in the UK's largest single tomato glasshouse, which covers an area of 18 hectares. The fruit are harvested between February and November.

All the produce is packed on-site in a modern packhouse, minimising handling and transport and allowing produce to be despatched for supermarket shelves directly from the nursery.

Over **8,500 bumblebees, living in 170 bee hives**, pollinate the crop and are part of the nursery's integrated approach to crop management using natural agents and predators in preference to agro-chemicals. Cornerways Nursery benefits from its location close to the factory. More than two hundred and forty miles of piping carries hot water from the factory's Combined Heat and Power (CHP) plant around the glasshouse, to maintain the balmy temperatures which suit tomato plants. This hot water would otherwise be destined for cooling towers, so the scheme ensures that the heat is used productively.

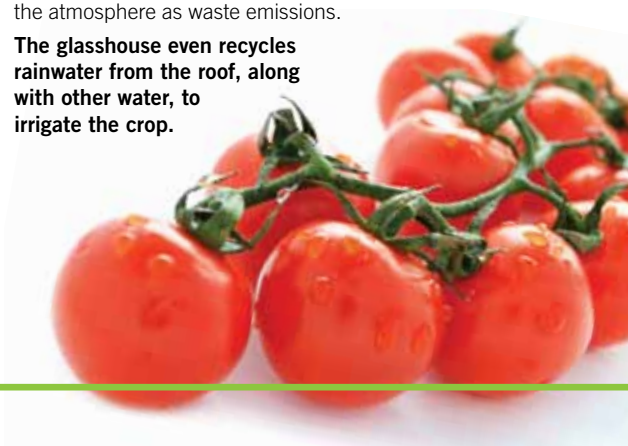
50 MW

Can be exported into the local electrical grid

Another benefit is the productive use of waste carbon dioxide from the factory, which tomatoes use during photosynthesis. At Cornerways, carbon dioxide (a by-product from the CHP boiler) is pumped into the enormous glasshouse to be absorbed by the plants, rather than vented into the atmosphere as waste emissions.

The glasshouse even recycles rainwater from the roof, along with other water, to irrigate the crop.

> **"We produce around 140 million 'eco-friendly' tomatoes each year"**



Sugar products

Wissington supplies 420,000 tonnes of sugar to food and drink manufacturers in the UK and across Europe.

90,000 tonnes of dry granulated sugar is despatched in a bulk format each year.

The site screens and bags sugar, producing caster, extra fine and granulated in 25kg bags. 1,000kg bags are also produced. 280,000 tonnes of bagged sugar is produced annually.

50,000 tonnes of sugar is dissolved in high quality water and dispatched as liquid sugar.

Some liquid sugar is inverted or mixed with invert sugars to make a blended product, which can then have a range of flavours and ingredients added to meet specific customer requirements.

"420,000 tonnes of sugar is supplied in the UK and across Europe"

Power generation

At the heart of Wissington factory's operations is the combined heat and power (CHP) plant. It produces steam and electricity using gas turbine technology. Over 50 MW can be exported into the local electrical grid, which is **enough for a population of approximately 120,000 people.**

The installation achieves the best CHP rating under the government CHP environmental quality assurance scheme.

The flue gas which traditionally goes to the chimney is diverted to the adjacent glasshouse. This provides heating and CO_2 which is essential to promote plant growth.

Bioethanol

A fermentation/distillation plant producing up to 55,000 tonnes of Bioethanol per year. This is used as a renewable fuel to blend with petrol.

Sugar syrups including the extract from the resin separation plant are mixed with yeast and fermented. The resulting 8% alcohol mash is then passed forward to distillation. The alcohol is boiled off from the water to produce a concentrated ethanol, which is 95% ethanol with 5% water. The remaining water is removed to produce a virtually 100% pure ethanol product.

Complex heat recovery systems minimise the energy demand of the plant. This ensures the plant achieves the low carbon footprint required to produce renewable biofuels.

The plant is the **first UK Bioethanol fuel plant** and received the award for Best New Project in 2007 from the Renewable Energy Association.

Wissington factory:
Produces up to 55,000 tonnes of Bioethanol fuel

Enjoy your visit

Keep yourself and our products safe

- Remain with your site contact at all times
- **Wear Protective Safety Equipment -** Safety helmet, eye protection, Hi Vis, sensible shoes, hearing protection
- Be aware of fire and evacuation procedures
- Typical safety hazards and what to do to keep safe:

  Vehicles - Always keep to designated walkways and crossings
  Slips and trips - Always hold stairway handrails, be aware of slippery surfaces and avoid spillages
  Hot surfaces - Be aware and do not touch vessels, pipelines and equipment
  Noise - Wear ear protection provided when instructed
- **Red buttons** - Do not push
- Dress appropriately in food handling areas - your site contact will explain our company policy and provide suitable protective clothing
- Wash hands before and after eating, smoking etc
- No smoking unless in designated areas
- No alcohol, glass or sharp objects allowed on site
- Anything we need to know?
  Health and medical conditions e.g. allergies / fear of heights / dietary requirements

Our people

Wissington's operations rely heavily upon the skill, knowledge and dedication of its team members. Along with 270 permanent staff we also engage up to 85 seasonal employees during campaign operations, supported by engineering contractors, facilities management operatives and agency workers.
With over 500 personnel directly associated with our on-site operations, a 'one-team' culture is critical to our success.

Wissington factory also has, on average, 16 apprentices within its scheme which attracts and trains talented young people to become a key part of the future of our business. They achieve real knowledge by spending time with our highly experienced staff, many of whom have worked with us for over 30 years.

Wissington relies on local contracting companies to provide a variety of essential work at the factory, including welding, cleaning, packaging, painting and civil works, as well as more specialist works and major capital installations.

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