BRITISH SUGAR

about Wissington factory

Largest beet sugar factory in the world

Most efficient in Europe

240 employees, 300 in campaign

Over 400,000 tonnes of sugar annually

Comprehensive range of products

Transforms inputs into sustainable products

Welcome to Wissington factory

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.**

Paul Hitchcock, Factory Manager.

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

Three million tonnes of sugar beet are produced by some 1,500 UK growers, at an average distance of 50km from the factory.

Beet samples are analysed in a central tarehouse at Wissington, which also serves all UK 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 15,000 tonnes of stone each year, which is washed and sold as an aggregate.

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 100,000 tonnes of dried animal feed are sold each year.**

> "Wissington produces much more than sugar"

Crystallisation

Up to 50% of the thick juice which is produced can be stored in 10 large steel tanks with **a combined capacity of 370,000 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 lower 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'.

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 to 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 condensed, used for further heating and then stored to be used in other processes on site.

After the sugar crystals are washed, dried and cooled, they are conveyed to seven concrete storage silos, with **a total bulk capacity of 98,000 tonnes.**

How our factory operates

Beet supplies

- 3 million tonnes of beet is delivered at an average distance of 50km from the factory.
- 1,500 growers

Purification

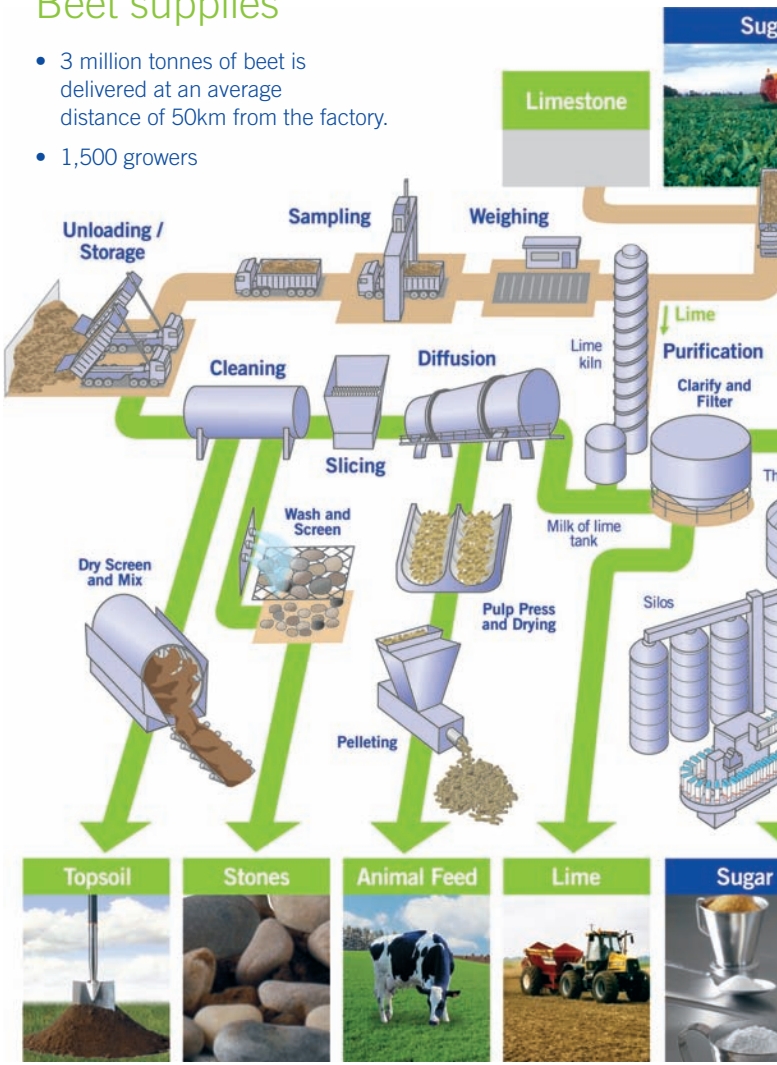
- First purification where milk of lime and CO_2 are added to precipitate calcium carbonate or chalk.
- Precipitated chalk is filtered, washed and pressed, producing 800 tonnes of LimeX per day.

TOPSOIL

- 65,000 tonnes produced and sold under the TOPSOIL brand each year.

Stones

- 15,000 tonnes of stone cleaned and sold as aggregate each year.



Animal feed

- Over 100,000 tonnes of dried animal feed are sold each year.

Sugar products

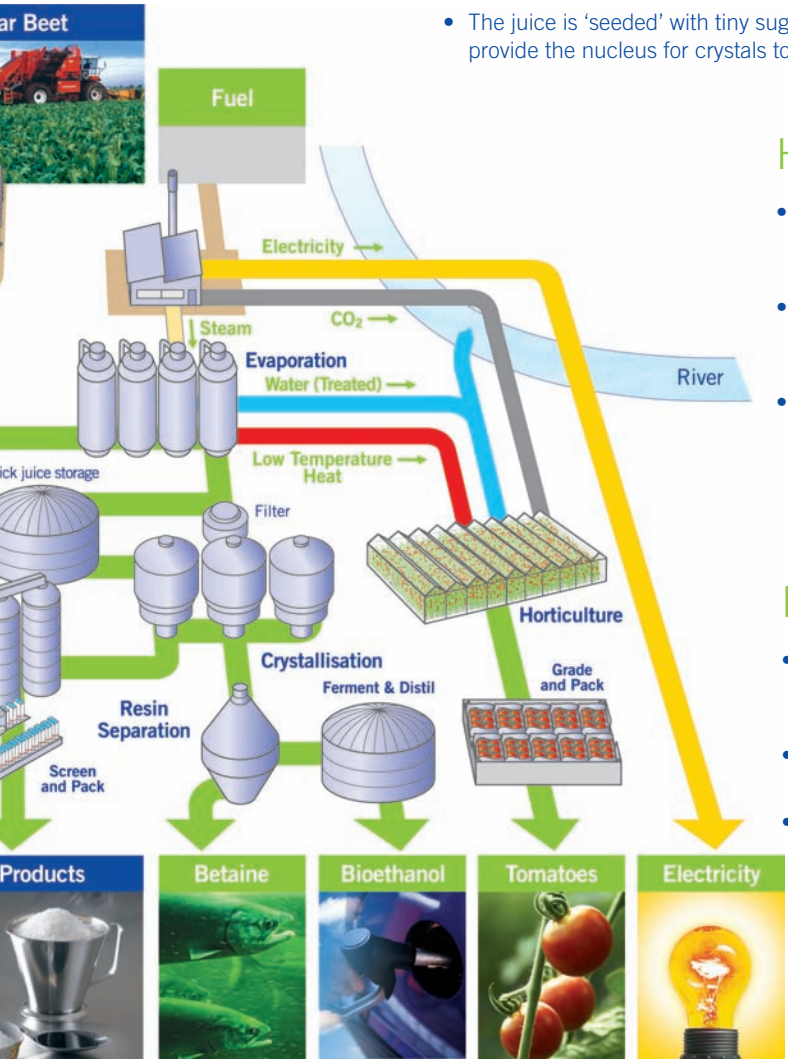
- Wissington supplies 400,000 tonnes of sugar to food and drink manufacturers in the UK and across Europe.

LimeX

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

Crystallisation

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



Horticulture

- UK's largest grower of classic round and speciality salad tomatoes.
- Glasshouse covers an area of 11 hectares and produces 70 million tomatoes per year.
- Can be on the supermarket shelf within 24 hours of being picked.

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 CHP environmental quality assurance scheme.

Resin

- 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.

Bioethanol

- A fermentation / distillation plant producing 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.

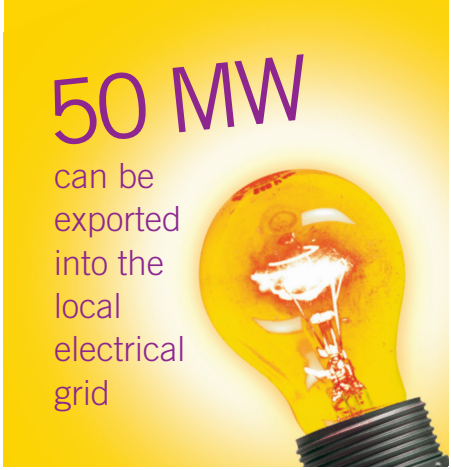
Resin separation

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 along 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.



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 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 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 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.

Sugar products

Wissington supplies 400,000 tonnes of sugar to food and drink manufacturers in the UK and across Europe.

200,000 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. 150,000 tonnes of bagged sugar is produced annually.

40,000 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.

> “Complex heat recovery systems minimise the energy demand of the plant”

Horticulture

Wissington is the **UK’s largest grower of classic round and speciality salad tomatoes.** The glasshouse covers an area of 11 hectares and produces **70 million tomatoes per year** between March and December.

Produce is despatched daily and can be on the supermarket shelf within 24 hours of being picked.

Over 2,000 bumble bees are at work on the site, pollinating the tomato flowers. Natural predators are used to control pests.

Over 200km of heating pipes carry recovered heat from the adjacent factory to maintain optimum temperatures, **eliminating the need to burn additional fossil fuels.**

The CHP plant provides flue gas which is a rich source of carbon dioxide. CO_2 is essential for the photosynthesis process which the plants need in order to grow. Without the CO_2 the plants would grow much more slowly.

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

Company services

Operations Services Science are based at Wissington, **providing technical advice and analytical support to British Sugar sites and to many of our customers.**

Operations Services Research work on new business development opportunities. This is applied research and the group is integral to the developments in chromatography and bioethanol at Wissington.

British Sugar's distribution team is based at Wissington controlling the sugar delivery fleet for the company. Telemetry links to customer sites provide real time **monitoring of customer needs,** vehicle satellite tracking ensures the **highest standard of delivery service.**

Wissington works to a well established business management system which is registered to ISO 9001 and which encompasses the entire operation from buying the raw materials, through manufacturing and packaging to delivery. The facility also retains ISO 14001 Environmental Management; OSHAS 18001 Occupational Health & Safety Management; and BRC Global Higher for Food Safety accreditations.

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Enjoy your visit and **be safe**

As a visitor you will be personally supervised. Site PPE is hat, glasses, Hi Vis, sensible shoes, and hearing protection.

Your contact will discuss with you:

- Fire and evacuation
- Hazards on site
- Vehicle / pedestrian segregation
- Slips and trips / hot surfaces
- Dust explosion management
- Red buttons!
- Anything we need to know..? Health / heights / diet