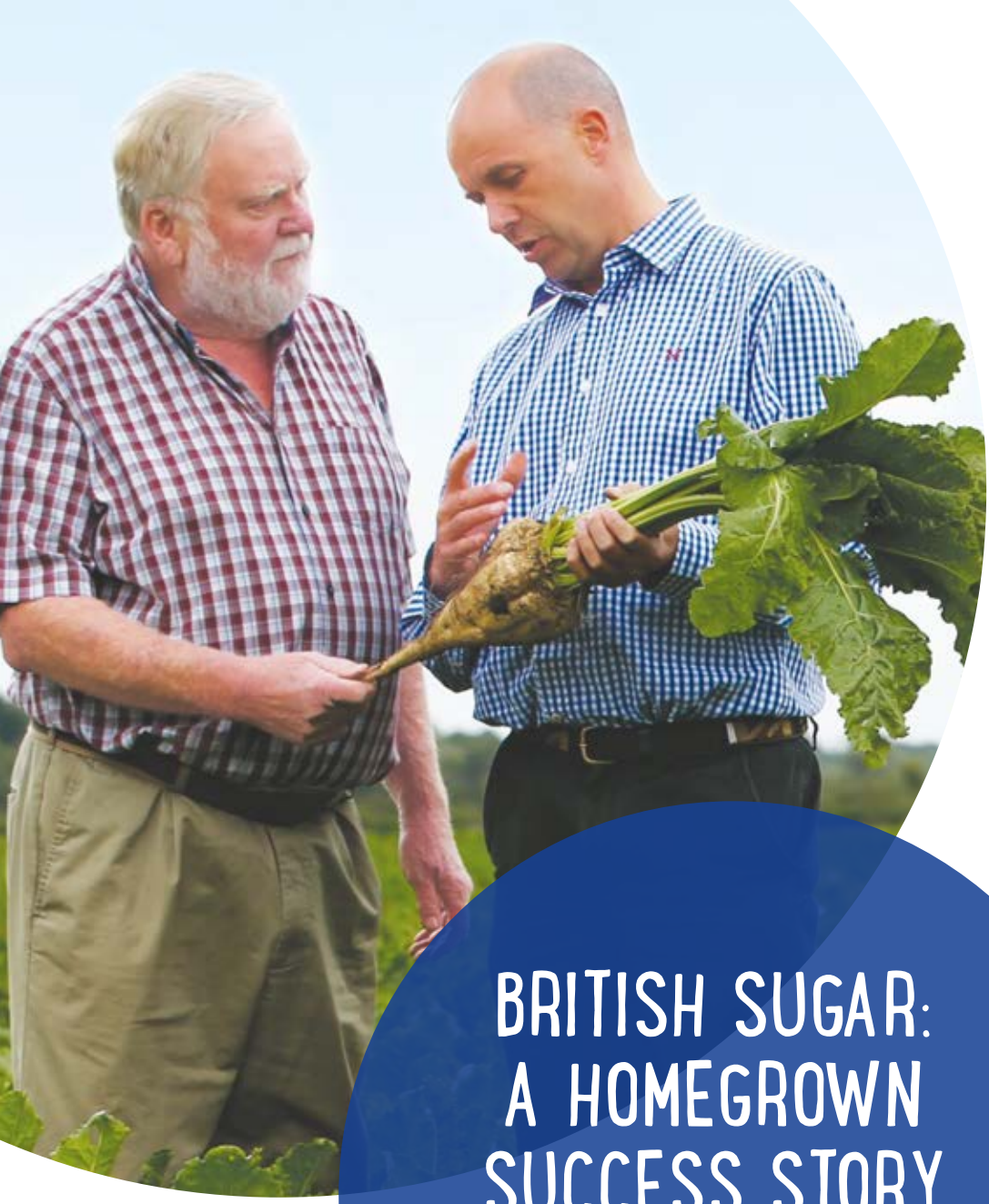
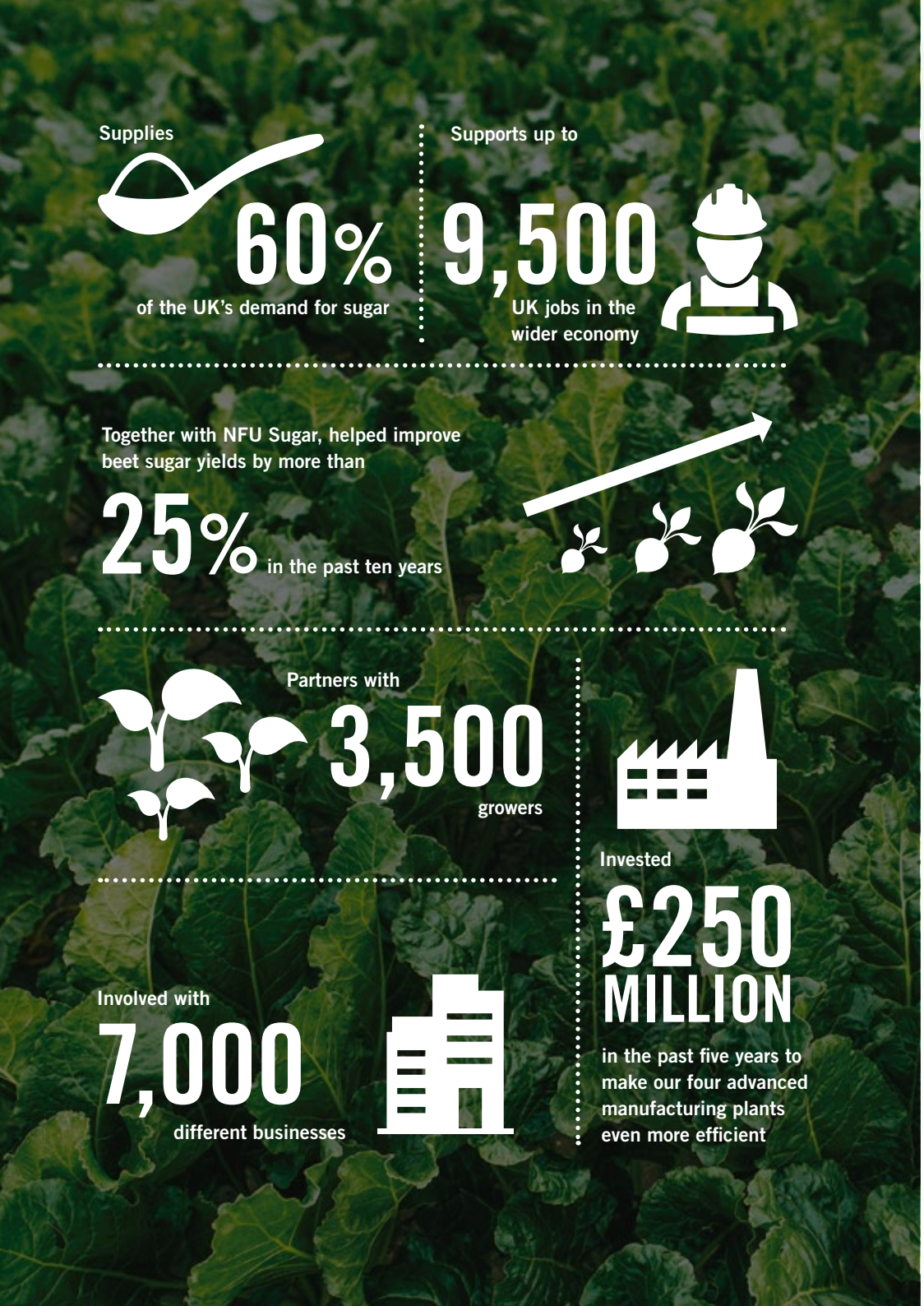


BRITISH SUGAR: A HOMEGROWN SUCCESS STORY

THE BENEFIT OF OUR BEET SUGAR INDUSTRY TO THE UK

BRITISH SUGAR

An AB Sugar Company



FEBRUARY 2017
Foreword by **Paul Kenward,** Managing Director, British Sugar

We have created a world-class British beet sugar industry, based in East Anglia and the East Midlands, that plays a critical role in the rural economy and future of farming. Whilst the future of agriculture in Britain is high on the national agenda and negotiations for the UK's exit of the European Union (EU) are due to start in the coming months, we've commissioned this report to comprehensively understand how our future performance could have a significant ripple-down effect on rural economies.

Across the homegrown sugar industry, we support up to 9,500 UK jobs in the wider economy and we are involved with 7,000 different businesses. Over 90% of our employees working in our operations are paid above the average earnings in the local area. In the 2015/16 campaign period we partnered with 3,500 growers who have increased beet sugar yields in the UK by more than 25% in the past ten years. British growers are currently achieving higher sugar yields than most of the EU.

Our success over the past ten years could not have been achieved without this investment and that of our partners. Over the past five years we have invested £250 million to make our advanced manufacturing plants in Bury St Edmunds, Cantley, Newark and Wissington as efficient and productive as possible. The result is that today, we supply 60% of the UK's sugar market.

But this investment has enabled us to do much more than just produce sugar. Our innovative approach to manufacturing has enabled us to use as much as possible of our raw material – sugar beet – to diversify and build a successful portfolio of co-products that positively impact other industries.

These include bioethanol, horticulture and even electricity; in fact we produce enough electricity to power 120,000 homes. All of which is achieved whilst reducing our resource consumption to make a positive change to the communities in which we operate.

The future of agriculture in Britain is high on the national agenda and not solely concerning the Brexit negotiations. From 1 October 2017, EU sugar quotas are being abolished following a decision made under the 2013 Common Agricultural Policy (CAP) reforms; this will be one of the biggest changes in the sugar sector since 2006 and offers the opportunity to increase the volumes our farmers can grow for us.

THIS IS THE STATE OF PLAY TODAY. BUT IT ALSO GIVES US A VISION FOR TOMORROW. WE WANT TO ACHIEVE EVEN GREATER SUCCESS IN THE NEXT 100 YEARS. TODAY'S REPORT SETS THE TONE FOR A 2017 THAT WE BELIEVE COULD PROVIDE MORE OPPORTUNITY FOR US. OUR SUGAR BEET FARMERS AND THE HOMEGROWN SUGAR INDUSTRY WHICH ULTIMATELY WOULD BENEFIT THE COUNTRY'S REGIONAL AND NATIONAL ECONOMIES.

Paul Kenward, Managing Director, British Sugar

The analysis in this report has been developed by Dr John Strak, Honorary Professor in Food Economics at the University of Nottingham since 2010. He began his career as a lecturer in agricultural economics at the University of Manchester in 1981. He has been a consultant and management executive dealing with agri-food issues since 1993 and has been directly involved with commercial projects and work that required the analysis and development of supply chains for domestic and export markets in the UK and overseas, and on training and workforce skills issues for the food and drink industry. Since 2010, British Sugar has made significant efforts to explore the current data and to develop new data sources so that the necessary calculations can be made with confidence. Aside from this input from British Sugar, this report's content and conclusions are the responsibility of the author. Any errors, omissions or opinions found herein are his.

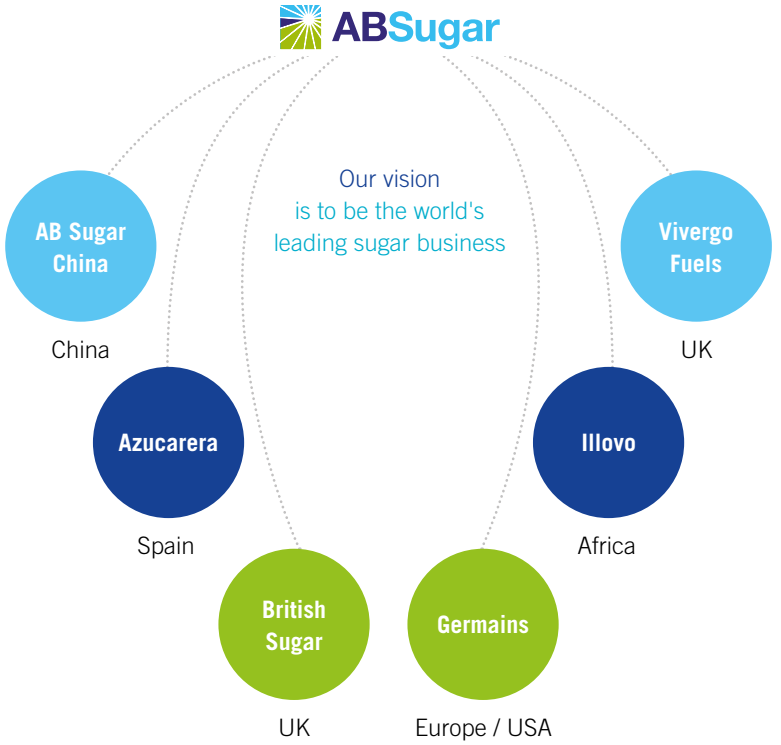
BRITISH SUGAR TODAY. PART OF A DIVERSE BUSINESS

AB Sugar is an international sugar business which in 2015/16 was the world's largest sugar producer[1].

AB Sugar is a group of businesses that is part of Associated British Foods plc (ABF), the international ingredients and retail group. It operates across 24 plants in ten countries and employs around 32,000 people.

The AB Sugar group includes British Sugar, AB Sugar China, Illovo, Azucarera, Germains and Vivergo Fuels.

Figure 1:



[1]FO Lichts, 2015/16

BRITISH SUGAR: A SNAPSHOT OF OUR IMPACT

Contributing to local economies: *the ripple effect of British Sugar in our communities*

The beet sugar supply chain is concentrated in rural areas and directly involves around

7,000 different businesses

including

3,500 farming businesses.

British Sugar is a

MAJOR CUSTOMER FOR MANY BUSINESSES

in the East of England region and the largest customer for some. Its annual spend on transport, storage, maintenance, and rates and rent is around £70 million. The spend on maintenance and equipment hire (£35 million) and distribution/warehousing (£29 million) make it a significant economic contributor for the region.

UK beet production occupies over

100,000 HECTARES

of UK farmland, supported by four advanced manufacturing plants in the East Midlands and East Anglia.

In 2014/15 British farmers received

£317 MILLION

in receipts from British Sugar. In total (including sugar beet costs) the spend on goods and services was in excess of

£600 MILLION

Supporting a skilled and efficient workforce around the UK

OVER 90%

of employees working in the beet sugar manufacturing plants are paid above the average earnings in their local area.

British Sugar invests in ensuring its people receive training and support that keeps their skill-set at an industry-beating level. This is the equivalent of around

12% of the total wage bill invested in employee training in recent years.

The complex nature of the sugar production process means British Sugar has focused on

EMPLOYING MORE HIGHLY-SKILLED EMPLOYEES

and this has contributed to the two-thirds increase in labour productivity.

9,500 JOBS

are created by the UK beet sugar value chain, offering jobs and economic opportunities in rural areas that have a distinct multiplier effect (direct and indirect jobs and incomes created).

Benefiting UK PLC

Contribution to the Exchequer

In 2014/15 the total revenue generated by British Sugar's workforce amounted to

£720 MILLION

As a single company we have paid more than

£200 MILLION

in corporation tax over the past five years.

British Sugar's production of sugar and animal feed from sugar beet represents a saving on UK imports of equivalent products worth about

£600 MILLION each year.

The tax payments by British Sugar to HM Government and local authorities as a result of the commercial operations in the UK amount to around

£50 MILLION per annum.

Investment

In the past five years, we have invested

£250 MILLION

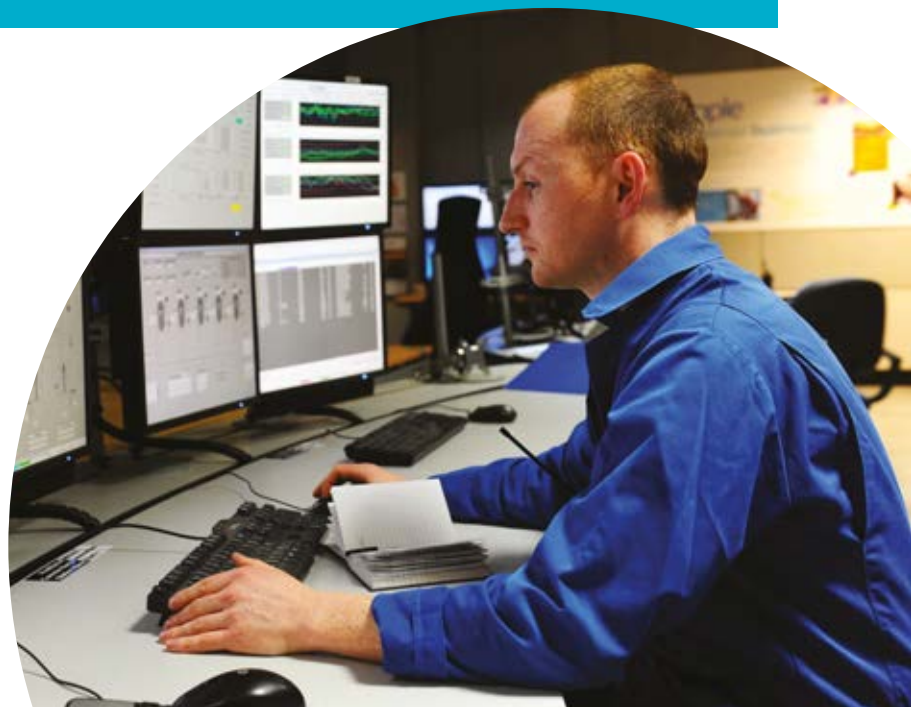
in our advanced manufacturing plants, making them ever-more efficient and ensuring capability remains world class. During 2016, British Sugar completed a £15m investment in an anaerobic digestion plant at the Bury St Edmunds factory. It will consume 100,000 tonnes of pressed sugar beet pulp as a feedstock and will generate five MW of electricity for export to the national grid.This investment will reduce our carbon emissions and our energy consumption by avoiding the need to dry the pulp or transport it offsite.

We **COLLABORATE** closely with other manufacturers and industries both in the UK and elsewhere, to ensure that we continue to evolve our business and remain industry leading.

BENEFITING UK PLC

PARTNERING WITH HONEYWELL TO REALISE OUR VISION OF A FACTORY IN 2025

To deliver British Sugar's vision of the sugar factory of the future, we've partnered with Honeywell to review and improve the control of our processes and identify new opportunities and technologies to ensure that we remain a world-class manufacturer. Our work with Honeywell comprises an investment of around £20m over 5 years and spans all our factories in the UK. From increasing collaboration between the factories, to consistency in how we operate, new systems and technologies are continually helping us to improve our factory operations, make better decisions and ensuring that we are the most reliable partner we can be for the companies we work with. Already we've installed tools that more closely monitor even the smallest change in the factories, improving our control in key areas such as energy and yield. We're working on systems that help our Managers access crucial data, faster than ever – with fewer spreadsheets. One of the biggest developments in our business in recent years is that 99% of the outputs from the sugar-making process are deployed and used to make other things or products, rather disposed of as waste. We do this through technology that ensures we're minimizing waste and extracting everything we can, as consistently and optimally as possible. And that in turn is helping our business to grow supporting our local communities and farmers.



Production

British Sugar provides sugar to over

170 INDUSTRIAL CUSTOMERS

– including some of the UK's largest food and drink manufacturers.

In the UK, 50% of the volume of sugar we produce is supplied to

15 MANUFACTURERS

GROWING PRODUCTIVITY & IMPROVING OPERATIONS TO BECOME MORE EFFICIENT

We are processing the same amount of beet today as we were 20 years ago, as a result of investing hundreds of millions of pounds in our advanced manufacturing plants to make them ever more efficient. 20 years ago, British Sugar needed nearly 10,000 farmers, ten factories and about 2,500 workers in its factories to produce the same amount of sugar that is now produced from 3,500 farmers, four factories and a factory workforce of about 1,500.

25% INCREASE

in sugar beet yields over the past decade. Sugar beet yield has outstripped the rate of yield growth compared to other arable crops grown in the UK.

The end of the EU sugar regime in October 2017 represents an opportunity for British Sugar to

INCREASE ITS SUGAR PRODUCTION.

Working alongside farmers we are providing innovative contracts to give more predictability and create healthy balance sheets.

Promoting best practice in UK agriculture – focusing on sustainability

THE FARMING OF SUGAR BEET CONTRIBUTES TO THE SUSTAINABILITY OF THE UK'S ARABLE FARM SECTOR

through its importance as a rotational crop. This means that sugar beet is just one of a variety of different types of crops in the same area in sequenced seasons. Doing this ensures that the soil of farms is not accustomed to only one type of nutrient. It helps to reduce soil erosion and increases soil fertility and crop yield. This is particularly important given the potential of healthy soil to act as natural carbon stores.

THE SUGAR BEET ROTATION HAS A POSITIVE IMPACT ON BIODIVERSITY,

especially for bird life. It provides cereal stubbles for winter habitat and food, and nesting grounds in spring. A wide variety of species benefit in this way, including internationally important populations of stone curlews and pink- footed geese.

BRITISH BEET SUGAR PRODUCTION UTILISES CIRCULAR ECONOMY PRACTICES

across a number of sectors for example horticulture, aggregate, biofuels and energy.

SUPPORTING A SKILLED AND EFFICIENT WORKFORCE AROUND THE UK

Job creation

Jobs are created in the manufacturing plants and on farms.
Suppliers to the factories also create more jobs as the demand for services increases in line with sugar production and the manufacturing processes.

Indirect effects arise through the increased demand for consumer goods and services, which arise from the higher employment and income levels on farms and factories.

In total, 9,500 jobs are created by the UK sugar beet supply chain.

The estimates of the impact of British Sugar on incomes and employment have been made using data from the UK market.

Figure 2: Employment multiplier effects (jobs)

	Sugar beet production	Sugar beet processing	Total
Direct employment	1,438	1,701	3,139
Indirect employment	1,625	3,937	5,562
Direct and indirect employment	3,063	5,638	8,701
Type I Employment multiplier ratio	2.13	3.31	2.77
Induced employment	325	429	754
Total employment	3,388	6,067	9,455

Impact on labour incomes

As well as creating employment and therefore incomes to workers, there are indirect effects of our presence in local areas. These effects include the purchase of sugar beet from growers as well as the suppliers we use vas part of our operations. This enables a broader knock-on benefit, as people are able to increase expenditure in their local areas.

It can be seen from Figure 3 that in 2016 our operations supported increased labour incomes to around £265 million.

Figure 3: Labour income multiplier effects (£m)

	Sugar beet production	Sugar beet processing	Total
Direct labour income	32.84	64.75	97.59
Indirect labour income	44.29	106.93	151.22
Direct and indirect labour income	77.13	171.68	248.81
Type I Labour income multiplier ratio	2.35	2.65	2.55
Induced labour income	6.95	9.37	16.32
Total labour income	84.08	181.05	265.13
Type I Labour income multiplier ratio	2.56	2.80	2.72

Note: Income multipliers have been narrowly defined to include only labour incomes rather than total value added, since this provides a better base for the induced effect. Figures 3 and 4 show the direct, indirect and induced impacts on labour incomes and employment for British Sugar. Induced effects arrive through the increased demand for consumer goods and services arriving from the higher employment and income levels on farms and factories. There are limitations to the input-output approach. These include the use of average responses to changes in output and demand for inputs, and neglect of the possibility of alternative uses of resources (especially land that is used in sugar beet production which could be diverted to other arable crops). These estimates avoid these errors and are considered to be reasonable and accurate measures of the “economic impact” of British Sugar plc.

Highly-skilled employees

The beet sugar industry has seen a need for more highly skilled employees. Figure 4 illustrates one proxy for a higher skilled workforce – its relative pay levels. At our sugar factories, 90% or more of our employees earn more than the local average pay.

Figure 4: Average earnings at different sites

Site (location)	Site (location) average gross annual pay (earnings) for full-time adults in the County or Unitary Authority, 2015	% of employees paid above the local average earnings figure (rounded)
Bury St Edmunds (Suffolk)	£24,420	99%
Cantley (South Norfolk)	£24,334	98%
Newark (Newark & Sherwood)	£21,722	99%
Wissington (King's Lynn)	£22,868	94%
Cornerways (King's Lynn)	£22,868	15%
Central Office (Peterborough)	£26,784	74%

We spend an average of around 12% of our wage bill on training each year to ensure employees have the skills the business requires. Separately, the Sugar Industry Programme (SIP), which is delivered with NFU Sugar and is now in its sixth year, continues to engage younger growers through a training and development programme. Each year, the participants learn about the beet sector in its entirety, including how the factory operates, seed production and industry research.

In summary, UK sugar beet production supports a healthy, thriving UK agricultural sector.

I WORK FOR BRITISH SUGAR AS A CROP PRODUCTION SUPPORT MANAGER, LOOKING AFTER BRITISH SUGAR'S "SELF-GROW" IN THE NEWARK AND WISSINGTON FACTORY AREAS, AS WELL AS SUPPORTING THE INDUSTRY HARVEST AND HAULAGE SCHEME.

I HAVE BEEN INVOLVED IN AGRICULTURE SINCE THE AGE OF 14. I STUDIED AGRICULTURE AT SPARSHOLT COLLEGE AND THEN AT THE ROYAL AGRICULTURAL COLLEGE. FROM THERE I WENT TO WORK ON FARMS AT A PRACTICAL LEVEL IN THE LINCOLNSHIRE AND BEDFORDSHIRE AREAS. I THEN SPENT A PERIOD IN THE UKRAINE WORKING FOR A COMPANY FARMING OVER 140,000 HECTARES AS OPERATIONS MANAGER FOR THE SUGAR BEET AND SPRING DRILLING SEASON, PLANTING OVER 33,000 HECTARES OF SUGAR BEET.

SINCE GETTING INVOLVED IN THE BEET SUGAR INDUSTRY, I HAVE STRIVED TO GAIN A BETTER UNDERSTANDING OF THE INDUSTRY AND KNOWLEDGE OF BEET. LOOKING AT THE PROGRAMME FOR THE SUGAR INDUSTRY PROGRAMME (SIP) AND SPEAKING TO PAST SIP MEMBERS, I FEEL THAT I WILL GAIN A GREATER UNDERSTANDING OF THE INDUSTRY WITH THE RANGE OF TOPICS COVERED.

Andrew Atherton: 2016/17 Sugar Industry Programme participant.

CONTRIBUTING TO LOCAL ECONOMIES: THE RIPPLE EFFECT OF BRITISH SUGAR IN OUR COMMUNITIES

Supporting rural communities

The beet sugar supply chain is concentrated in rural areas and directly involves around 3,500 growers based across over 75 parliamentary constituencies. In 2014/15 these British farmers received £317 million in receipts from British Sugar.

With the end of the EU sugar quotas in October 2017, we expect there will be more opportunities for sugar beet growers as the factories operate at full capacity.

> " WE COULD GROW ENOUGH BEET FOR BRITISH SUGAR TO PRODUCE AN ADDITIONAL 500,000 TONNES OF HOMEGROWN SUGAR, DEPENDING ON MARKET CONDITIONS. THAT WOULD CLEARLY MAKE THE UK LESS DEPENDENT ON IMPORTED SUGAR AND WOULD BE GOOD FOR RURAL ECONOMIES AS WELL AS THE COUNTRY'S OVERALL BALANCE OF PAYMENTS.
>
> Michael Sly, a sugar beet farmer with 1,600 hectares in East Anglia, who sits on the NFU's Sugar Board.

Working with local businesses

In addition, our supply chain involves around 7,000 different businesses making it one of the largest customers for many goods and services in the East of England.

Our annual spend on transport, storage, maintenance, rates and rent is around £70 million. The spend includes maintenance and equipment hire (£35 million) and distribution/warehousing (£29 million).

ABBEY LOGISTICS IS ONE OF OUR LATEST PARTNERS AND PROVIDES BULK TANKER TRANSPORT FROM OUR FACTORIES TO OUR INDUSTRIAL CUSTOMERS.

Abbey Logistics is an important partner for us, given the company's focus on responsible resource use. In that respect, Abbey Logistics shares common values with British Sugar, and the relationship between the two businesses is based on ensuring that environmental impact from operations is minimised. Abbey Logistics is a greener European logistic provider operating bulk liquid tankers.

We are working together with Abbey Logistics on a number of new initiatives, including innovating to make efficient use of our transport fleet to reduce the energy needs of British Sugar operations and reduce greenhouse gas emissions, as well as minimising water use during tanker washing.

Abbey Logistics is also planning to install telematics into every British Sugar truck and train their drivers on how to drive vehicles more efficiently. In their wider business this has reduced fuel consumption by 3%, and they're hoping to achieve the same with the British Sugar fleet.

CHAPTER 3

BENEFITING UK PLC

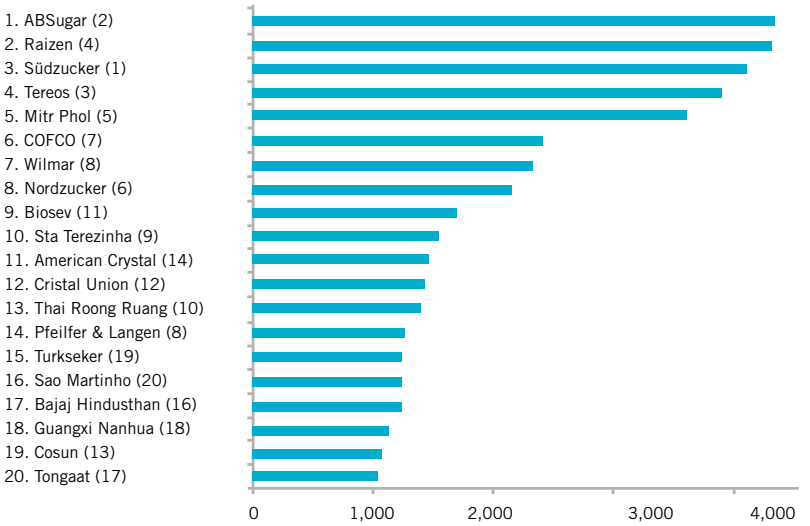
Most efficient processor in Europe

We are not only part of the largest sugar producer in the world, but we are also one of the most cost efficient processors in Europe. This claim is supported by the work that LMC International Ltd (an agribusiness consultancy) does on world sugar production comparative costs, compared by country and region.

By way of an example, F.O. Licht's key figures are summarised in Figure 5 covering a run of years up to 2015/16 for beet sugar.

Figure 5: World – Sugar Production by Company

(1,000 tonnes rv, 2015/16, figures in brackets = 2014/15 rank)



Our factories run for longer, field to factory costs are lower, and our process control functions are amongst the most advanced of any sector in UK industry, rivalled in complexity and technology only by the systems required to control a modern oil refinery.

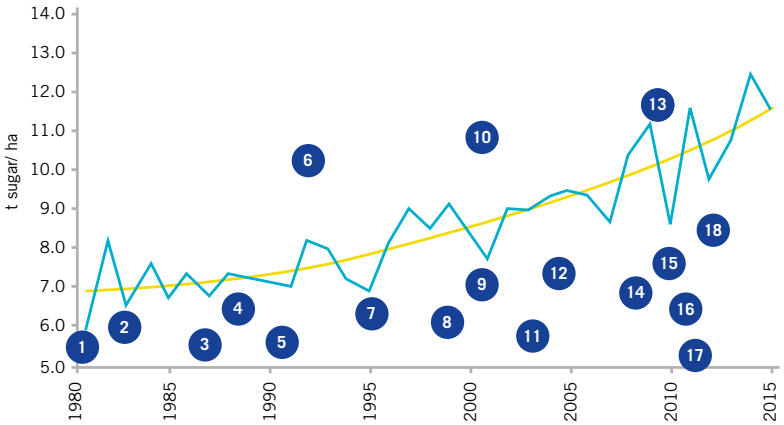
Working with farmers to improve yield

We have worked with NFU Sugar and growers to improve productivity across the entire sugar beet supply chain. The manufacturing sites each work to an improvement plan, whilst seed breeders continually look for improvements through improved varieties. Growers are also continually exploring technical innovations which can help drive productivity whilst using the latest research to inform their operations.

We have improved efficiency and technical progress in the development of new co-products, as well as in the reduction of waste in our factories.

Over the past 30 years, sugar yields expressed on a per hectare basis, have grown at 2% per year. Since 2001, the incremental rate of growth has increased to 3% annually. Yield increases have also been achieved with fewer inputs per hectare of fertiliser and pesticides. Not only has the industry maintained and improved that rate of annual yield growth but it has outstripped the rate of productivity increase in all other arable crops grown in the UK.

Figure 6: UK Sugar Beet Productivity t/ha sugar

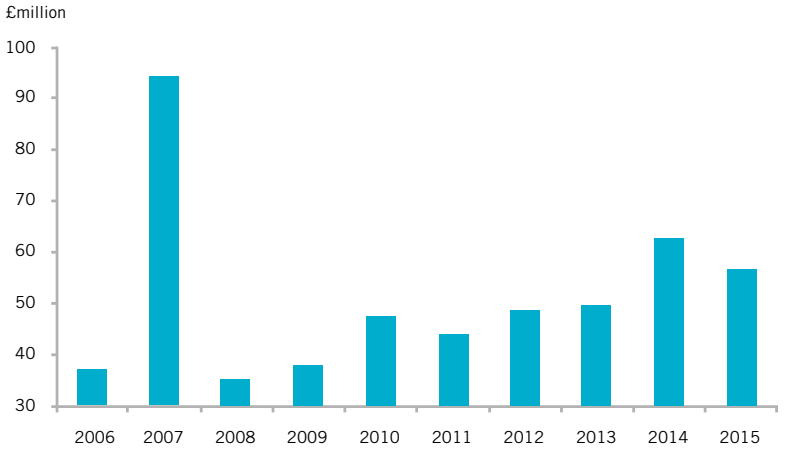


Graph Key: 1: Herbicides 2: Soil Management 3: Storage 4: Seed Insecticides 5: Quality Harvesting 6: K offtake Calculator 7: Early Drilling 8: Fungicides 9: CPI 10: Outgrowers initiative rationalisation of the power base 11: Quality Harvesting 12: 20:20 13: XBeet plus 14: Target 70 15: BCN tolerant varieties 16: Industry harvesting & haulage initiative 17: Quality Drilling & drill testing 18: 4 x 4

Investing for the future

Our capital expenditure highlights ongoing spend in innovation and productivity-improving measures. An average of around £50 million spent on capital investment each year represents about 10% of annual revenues being spent on efficiency enhancements annually over the past decade. These investments have been in new plants and equipment, and have resulted in reduced costs and carbon emissions. The total capital investment over the past ten years adds up to circa £500 million.

Figure 7: Investment by British Sugar 2006–15



Across the business approximately £600 million is spent each year, of which £300 million is spent on sugar beet, £80 million on utilities, £30 million on contractors and around £60 million spending to support production. This underlines the broader contribution of British Sugar to the local economies where it operates.

CHAPTER 4

PROMOTING BEST PRACTICE IN UK AGRI-BUSINESS – FOCUSING ON SUSTAINABILITY

We are focused on delivering responsible growth in the UK. Embedded in our business is a culture of continuous improvement, delivered through our Performance Improvement Plan (PIP); a central pillar of which is resource management. To this end, British Sugar has built a business model around using resource more efficiently and developing new revenue streams from resource waste. This includes everything from new horticulture practices to off-setting our use of fossil fuels through bioenergy generation.

Over the past five years we have invested £250 million in our four advanced manufacturing plants, introducing new technology and practices to improve resource efficiency and ensuring that our manufacturing capability remains world class.

We now generate 25% of our revenue from non-core sales. We sell topsoil for landscaping, aggregate for building, animal feed, chemicals for the cosmetics industry, bioethanol fuels, liquefied carbon dioxide for a range of industries and electricity to the national grid.

Energy

Target	Reduce energy usage across product segments by 2% by 2020 when compared against 2015 baseline
2016	3,204,569 MWh 9.6% reduction since 2014 **Source:** All primary energy input, all sites (inc Holmewood Hall, Bardney & Head Office) from ABF data 2015/2016.

CO2

Target	Reduce the amount of carbon dioxide we emit per tonne of sugar from 636kg CO_2 to 612kg CO_2 by 2020
2016	689,808 tonnes 7.2% reduction since 2014 **Source:** CO_2 from primary energy input excluding CO_2 for electricity exported, all sites (inc Holmewood Hall, Bardney & Head Office) from ABF data 2015/2016.

Waste

Target	Zero non-hazardous waste to landfill
2016	Waste recycled: 98.5% **Source:** 2015/16 ABF data.

Water

Target	20% reduction by 2020
2016	1,094,556 m^3 of water 13.2% reduction since 2014 Note: In the reporting period our sites were net exporters with over 2,600,000m^3 returned to local water courses. **Source:** All water use, all sites (inc Holmewood Hall, Bardney & Head Office) from 2015/16 ABF data.

Encouraging biodiversity

Biodiversity in arable cropping is increased if sugar beet is included. In evidence given to the House of Lords Select Committee on the European Union, the RSPB noted that “as a root crop it has become a very valuable part of arable farming, because sugar beet has the important effect of breaking up the mainly cereal-based crop rotations (as demonstrated in some EU countries, the cereal yield after beet can be 10-20% higher compared to the cereal yield after two years of successive cereals). Because sugar beet is seldom a host to pests and diseases which affect combinable crops, the cultivation of sugar beet reduces the level of diseases and pests and therefore reduces the amount of pesticides applied”. This statement is supported by a study on the beet sugar industry’s carbon footprint.

The RSPB emphasises that UK sugar beet production supports “internationally important populations of pink-footed geese and nationally important populations of stone curlews”, and is “associated with a uniquely high wildlife conservation benefit”. After the sugar beet harvest from September to February, the birds are attracted to the remaining beet tops for food.

Species include the pink-footed goose, skylark, golden plover, pied wagtail, meadow pipit and various breeds of swan. In fact, during autumn and winter, more than a quarter of the world’s population of pink-footed geese feed and forage on sugar beet tops and stubble in eastern England.

CHAPTER 4

Beet sugar production across British Sugar sites supports wildlife species suffering from population decline in the UK. This includes the small Heath Butterfly, the Sand Martin, Lapwing and Water Vole. Our advanced manufacturing site in Wissington provides a valuable habitat for many species including Reed Warbler, Speckled Wood Butterfly and Muntjac. In addition our ponds offer a unique setting for hundreds of migratory and non-migratory birds including Egyptian Goose, Little Grebe, Mallard, Grey Heron, Oystercatcher and Kingfisher.

Virtually zero waste

The focus on driving up productivity has also been of huge benefit from an environmental perspective – fewer inputs per unit of output means lower waste and carbon emissions. Specifically, our production process produces virtually zero waste with less than 200 grams of waste for every tonne of sugar produced.

Moving to circular production

British Sugar factories operate an advanced manufacturing model that avoids waste by turning process outputs into inputs for a wide range of products. By moving to a circular economy model of production, British Sugar benefits through making the best use of available resources to minimise cost and operating responsibly.

Utilising output from the sugar-making process

The portfolio of co-products utilise 99% of the outputs from its sugar- making process. These products include bioethanol and electricity. British Sugar produces enough electricity from its highly efficient Combined Heat & Power (CHP) plants to power a city the size of Peterborough – supporting decentralisation of energy supply in our communities.

The products generated by the processes involved in growing sugar beet and extracting sugar from the harvested crop make up a long list and include:

- SUGAR
- MOLASSES
- BETAINE
- RAFFINATE
- ELECTRICAL ENERGY FOR THE LOCAL GRID FROM CHP BOILERS
- ANIMAL FEED
- HORTICULTURE
- TOPSOIL
- LIMEX
- AGGREGATES
- BIOETHANOL

Sourcing locally

Food miles are reduced through the growing of sugar beet in the UK. The beet is sourced from local growers in eastern England and it is cultivated on average, 28 miles from the sugar factories. The resulting UK-produced sugar travels an average distance of 168 miles from beet to bulk delivery point at the sites of UK customers.

Applying best practice in sustainability

British Sugar works to ensure that best practice environmental measures are applied to all aspects of beet sugar production. It operates under the UK's Climate Change Agreement Scheme and the EU Emissions Trading Scheme to reduce energy consumption and carbon emissions.

Sugar beet is grown according to Red Tractor Combinable Crop and Sugar Beet Assurance Standards and these standards, combined with UK legislative requirements, have achieved Silver level equivalence with the SAI Platform's Farm Sustainability Assessment (FSA) 2.0. This covers production, food safety and environmental safety criteria and has become a condition of all of British Sugar's grower contracts. Food produced to this standard is eligible to carry the prestigious Red Tractor logo.

Energy efficiency

There has been investment of around £1 billion in the last two decades to continuously improve the use of raw materials, installing new technology in energy efficiency, gas and water treatment. This substantial investment has increased operational agility and enabled British Sugar to explore new product stream opportunities. All of British Sugar's sites operate using an integrated Energy Management System (EnMS) which is externally certified to ISO 50001. It is designed to continuously monitor, review and improve energy performance and minimise the impact of activities.

Carbon savings

In December 2008, British Sugar became the first sugar manufacturer to calculate, certify and publish the carbon footprint of its sugar using the new PAS 2050 method. PAS 2050 was the world's first standard for measuring the lifecycle of greenhouse gas emissions of goods and services, developed by BSI British Standards and sponsored by the Carbon Trust and the Department for Environment Food and Rural Affairs (DEFRA).

Reducing water use

Sugar beet is a root crop which is made up of sugar, fibre and a large amount of embedded water. British Sugar purchases around 7.5 million tonnes of the crop annually. A large proportion of this (over 5.5 million tonnes) is actually embedded water. The company extracts this water and, where possible, uses it in its factories for process duties such as cleaning, heating, cooling and transportation. In total, over 80% of the water used by British Sugar derives from the beet plant whilst the remaining sources are from rivers (5%), bore holes (7%) and town mains (6%). Each factory has its own water treatment facilities where water is held in a number of 'lagoons' before it is treated and returned to source. Water treatment is carried out in accordance with strict Environmental Permit requirements before release. All of the water received is either reused within our manufacturing process, returned to water course or evaporated to air as steam.

APPENDIX – METHODOLOGY

The impact of the number of jobs created directly and indirectly by beet sugar production is calculated and compared with a previous calculation by Professor Midmore and Dr Strak in 2005 and the University of Reading[2] in 1994.

The approach used to measure the indirect and induced impacts of beet sugar production in the UK is based on input-output multipliers. However, two departures from the standard method have been made.

- Conventional input-output multipliers work on the basis that there would be a change in final demand for an industry's output. However, in the case of sugar (recognising its extensive use as an input to other industries) it is its gross output that would change if the company ceased operations. Hence a mixed model (based on Johnson and Kulshreshtha, 1982) is used, which eliminates any over-estimation of the indirect and induced effects.

- Input-output sectors are generally very broad: for example, in the UK model, sugar beet production is included in the overall 'Products of agriculture, hunting and related services' sector, whereas sugar refining is included in the residual 'other food products' sector. Use of the aggregate sector multiplier risks serious aggregation bias. Here a modified approach utilising the purchased inputs of the production and processing sectors has been used, which considerably reduces the aggregation bias (Lindberg et al., 2012).

The multipliers are based on 2010 UK input-output accounts (see Office for National Statistics, 2014), which are the most recently published. The 2015 accounts are unlikely to be published until 2019. The multiplicands (changes in gross output that would occur if British Sugar operations in the UK ceased) are drawn from management accounting data for 2014/15 for the processing sectors and estimated from the John Nix Farm Management Pocketbook (Redman, 2015),

[2] "Britain's Beet Sugar Supply Chain", a report by Professor Peter Midmore and Dr John Strak (June 2005), and "The Economic Impact of the British Beet Sugar Industry" by Dr David Hallam, Dr Peter Midmore, and Professor the Lord Peston, Department of Agricultural Economics and Management, University of Reading (1994).

for the production sectors, supplemented and validated where necessary from Farm Business Survey data (Lang, 2016). Employee data is categorised as full-time, part-time, and contractors/seasonal. The last two categories have been assumed to be 0.5 of full-time equivalent jobs.

The figures in the table on page 31 show the purchases of British Sugar categorised by broad industrial sector, and these are used to calculate the indirect and induced multiplier impacts. It needs to be noted that, along with the core business of sugar production and refining, there are joint or co-products and vertically integrated activities. The former includes utilising waste heat from the refining process in horticulture, production of beet pulp for animal feed and the sale of surplus electricity. These are closely linked to refining because without the core activity they could not exist. The latter includes a sugar beet seed company and a bioethanol subsidiary. These are less closely linked to the core activity, in the sense that they could exist as stand-alone enterprises. In particular, the bioethanol subsidiary is currently using wheat as a feedstock.

Summary gross output change vectors

SIC Code		Sugar beet production	Sugar beet processing
01-03	Agriculture, forestry and fishing	19.98	8.25
05-09	Mining and quarrying	0.00	11.72
10-33	Manufacturing	62.68	90.36
35	Electricity, gas, and water supply	4.74	66.91
41-43	Construction	0.00	0.00
45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles	0.00	0.00
49-53	Transportation and storage	39.35	42.28
55-56	Accommodation and food service activities	0.00	0.15
58-63	Information and communication	0.00	1.89
64-82	Financial, professional and administrative activities	6.18	78.85
84	Public administration	0.00	0.00
85-86	Education, health and social work	0.00	0.00
90-96	Other services	0.00	0.00
	Total	132.93	300.41

*The beet sugar production process also produces approximately 500,000 tonnes of high digestible fibre feeds each year. The UK ruminant feed market has an annual demand for approximately one million tonnes of this feed category and if the UK did not produce this feed then substitutes would have to be imported from the USA, Russia or Argentina.

CONTACT

British Sugar plc
Sugar Way
Peterborough
PE2 9AY

communications@britishsugar.com
www.britishsugar.com

February 2017