

THE ECONOMIC IMPACT OF DRAX GROUP IN THE UK

SEPTEMBER 2016

Oxford Economics

Oxford Economics was founded in 1981 as a commercial venture with Oxford University's business college to provide economic forecasting and modelling to UK companies and financial institutions expanding abroad. Since then, we have become one of the world's foremost independent global advisory firms, providing reports, forecasts and analytical tools on 200 countries, 100 industrial sectors and over 3,000 cities. Our best-of-class global economic and industry models and analytical tools give us an unparalleled ability to forecast external market trends and assess their economic, social and business impact.

Headquartered in Oxford, England, with regional centres in London, New York, and Singapore, Oxford Economics has offices across the globe in Belfast, Chicago, Dubai, Miami, Milan, Paris, Philadelphia, San Francisco, and Washington DC. We employ over 230 full-time people, including more than 150 professional economists, industry experts and business editors—one of the largest teams of macroeconomists and thought leadership specialists. Our global team is highly skilled in a full range of research techniques and thought leadership capabilities, from econometric modelling, scenario framing, and economic impact analysis to market surveys, case studies, expert panels, and web analytics. Underpinning our in-house expertise is a contributor network of over 500 economists, analysts and journalists around the world.

Oxford Economics is a key adviser to corporate, financial and government decision-makers and thought leaders. Our worldwide client base now comprises over 1000 international organisations, including leading multinational companies and financial institutions; key government bodies and trade associations; and top universities, consultancies, and think tanks.

September 2016

All data shown in tables and charts are Oxford Economics' own data, except where otherwise stated and cited in footnotes, and are copyright © Oxford Economics Ltd.

This report is confidential to Drax Group plc and may not be published or distributed without their prior written permission.

The modelling and results presented here are based on information provided by third parties, upon which Oxford Economics has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

To discuss the report further please contact:

Osman Ismail, Senior Economist: oismail@oxfordeconomics.com

Pete Collings, Lead Economist, petecollings@oxfordeconomics.com

Oxford Economics, Broadwall House, 21 Broadwall, London, SE1 9PL, UK

Tel: +44 207 803 1400

TABLE OF CONTENTS

Executive Summary	3
1. Introduction.....	5
1.1 The UK's energy landscape.....	5
1.2 Drax Power Station	5
1.3 Drax Group.....	6
1.4 Our approach	6
2. The impact of Drax Group's operations	8
2.1 Direct impact of Drax Group	8
2.2 Indirect impact of Drax Group	9
2.3 Induced impact of Drax Group	12
2.4 Total contribution of Drax Group.....	13
3. The impact of Drax Power Station's biomass conversion.....	15
3.1 The conversion's GDP contribution	15
3.2 The conversion's employment contribution	16
3.3 The conversion's fiscal contribution	18
4. Catalytic benefits of Drax Power Station's conversion	19
4.1 Port investments	19
4.2 Freight capacity	21
4.3 The total economic impact of partners' investments.....	22
5. Conclusion.....	23

EXECUTIVE SUMMARY

Drax Group is one of the UK's largest energy companies. It has three principal activities: electricity generation, electricity sales to business customers, and processing compressed wood pellets for use in electricity production.

6 million

homes powered by Drax
Power Station

Drax Group has, in recent years, converted and upgraded half of the Drax Power Station in North Yorkshire—its key asset—to use compressed wood pellets instead of coal. In doing so, it has achieved carbon savings of over 80 percent compared to coal and has become the UK's single largest source of renewable power. In the first half of 2016, 20 percent of the UK's renewable electricity came from Drax's biomass units.

Drax Power Station is the largest power station in the UK, supplying enough electricity for six million homes. Upgrading three of its units to biomass has enabled those units to continue to generate secure, reliable and affordable electricity at a time when other coal power stations across the UK are facing closure.

As well as generating electricity, Drax Group also makes an important economic contribution to the Yorkshire and the Humber, and the UK more widely. Its pioneering project to become a primarily biomass-fuelled generator has been underpinned by significant investment in the power station and new freight logistics and infrastructure across the North of England.

This report quantifies Drax Group's economic contribution by exploring:

- (1) The on-going economic value generated by Drax Group through its production and supply of electricity.
- (2) The economic impact of the work undertaken to convert three of Drax's generating units from coal to biomass.
- (3) The economic benefits of the investments made by Drax Group's partners, such as port and freight operators, in the UK's biomass supply chain.

£1.2 billion

GDP contribution in 2015

Supporting 14,150 jobs

THE IMPACT OF DRAX GROUP'S OPERATIONS IN 2015

Drax Group creates economic value directly, through its production and supply of electricity. Its direct GDP contribution in 2015, broadly equivalent to the sum of its wages and gross profits, reached £284 million. Drax employed almost 1,300 people directly to produce this impact.

Drax's economic impact increases to more than £1.2 billion when taking into consideration the activities in its supply chain and the wages that its staff (and supplier's staff) spend in the wider consumer economy. Once these multiplier effects are accounted for, Drax Group is estimated to have supported a total of 14,150 jobs across Britain in 2015. Moreover, the activity and employment supported by the Group, once again including multiplier channels, generated over £430 million in tax revenues for the UK Exchequer.

THE IMPACT OF DRAX'S BIOMASS CONVERSION PROJECT

Converting three of Drax's six generation units to burn wood pellet fuel involved £365 million in capital expenditure in the UK by Drax Group, over a period of six years. These works included modifications to the generation units, as well as the construction of state-of-the-art facilities to receive and store biomass fuel, and implementing new control and safety apparatus.

The conversion generated in excess of £430 million in GDP, when measured in 2016 prices, and supported over 7,000 annual jobs.¹ During this programme, a commitment to local suppliers and contractors meant almost half the total GDP and jobs impact was retained in the Yorkshire and Humber region. In addition, some £118 million in tax revenue, again measured in today's prices, was generated over the six-year process.

INVESTMENT BY DRAX'S PARTNERS IN UK BIOMASS SUPPLY CHAIN

The conversion required the development of an entirely new infrastructure, creating wealth and jobs. Drax and its partners—the Port of Tyne, the Port of Liverpool, the Humber ports of Immingham and Hull, DB Cargo UK and GB Railfreight—together developed a large, specialised freight and logistics infrastructure dedicated to the import, storage and delivery of wood pellet fuel. Port operators, freight service providers and rail wagon manufacturers all undertook work linked to the biomass conversion.

In the eight years to 2016, these capital investments contributed almost £280 million to UK GDP, measured in 2016 prices. They also supported around 4,400 annual jobs. Beyond the construction phase, this biomass infrastructure now supports a range of permanent jobs, from operations at the port facilities to the provision of logistics services for biomass cargo.

£710 million

in GDP from biomass
conversion investments

*Encompassing projects by
Drax Group and four Ports
(Tyne, Liverpool,
Immingham, Hull)*

THE TOTAL ECONOMIC CONTRIBUTION OF DRAX

Through the investments of both Drax Group and its partners, the conversion process has given rise to more than £710 million in GDP since 2009, when measured in today's prices. These ambitious engineering projects have driven huge demand and supported thousands of jobs in many industries and communities in Yorkshire and northern England, during what have been challenging times for many heavy industrial sectors.

Drax's conversion is environmentally and strategically very significant. As a result, a historically coal-based asset is now driven predominantly by biomass, delivering enormous environmental advantages, with a dependability and predictability that is beyond other sustainable resources. This asset has important strategic value for a national energy system that is under a longer-term process of decarbonisation, and confronting the possibility of a capacity crunch over the coming years. While these advantages are not quantified here, they undoubtedly have economic value. As such, the true benefits of the conversion are very likely even greater than the figures discussed in this report.

¹ One annual job refers to the employment of one person for one calendar year.

1. INTRODUCTION

1.1 THE UK'S ENERGY LANDSCAPE

Britain is committed to reducing its greenhouse gas emissions by 34 percent (relative to 1990 levels), and to producing 15 percent of its energy from renewable sources by 2020. In pursuit of this aim, the UK Government announced earlier this year its intention to take coal generation off the system completely by 2025. Many coal-fired power plants have already closed well ahead of this target due to difficult economic conditions and new environmental regulations.

While coal use has trended downwards for many years, completing this phasing out will still be challenging. Electricity from coal remains a significant component of Britain's energy mix: coal-fired plants contributed 23 percent of total electricity generation in the UK during 2015. Furthermore, coal stations have historically provided a number of important support services to National Grid, including system balancing, frequency response and black start. These services are currently worth £1 billion to the UK grid and are estimated to rise to £2 billion by 2020².

Given the overarching goal of decarbonisation, coal use must be curtailed. But clearly, replacement generation capacity will be needed over the coming years.

While a growing share of renewable sources will form part of the solution, technologies such as solar PV and wind power are intermittent in nature. Their power output cannot be delivered exactly on demand to meet users' requirements. This means that other complementary sources of dependable, dispatchable and renewable power are crucial if the UK's energy infrastructure is to continue meeting the needs of households and industrial users.

Biomass generation is one technology that meets these criteria. Moreover, the conversion of coal power stations to burn biomass fuels can provide continued productive use for some of the UK's existing coal assets. This is a considerable advantage at a time when relatively little additional capacity is under construction.

1.2 DRAX POWER STATION

Drax Power Station opened in two phases in 1974 and 1986 and remains the largest electricity generator in the UK, providing sufficient electricity to meet the needs of six million homes. Given this scale, it is a strategically important power asset for Yorkshire as well as for the wider UK.

Following a decade of research and development, Drax Group's current focus is to transform the power station into a predominantly biomass-fuelled generator. By 2016 this goal had been achieved, following the conversion and upgrade of three of the station's six units from coal to compressed wood pellets. Reducing the plant's reliance on coal and expanding into renewables

² "Balancing demand 'could cost National Grid £2bn'," *The Telegraph*, 27 June 2016
<http://www.telegraph.co.uk/business/2016/06/26/balancing-demand-could-cost-national-grid-2bn/> [accessed 2 September 2016]

was a huge undertaking. It required complex modifications to the power plant, as well as the development of an entire infrastructure to manufacture, store and deliver the wood pellet fuels to the Drax site in Selby, North Yorkshire.

1.3 DRAX GROUP

Drax Group commissioned Oxford Economics to investigate its economic impact in the UK.³ While Drax Power Station is Drax Group's key asset and accounts for the bulk of the Group's economic footprint, the Group's activities today include more than just wholesale power generation. This report also considers the economic impact of:

- **Haven Power**, the Group's retail arm based in Ipswich, which serves the electricity needs of a growing number of SMEs, large business and organisations;
- **Billington Bioenergy**, which supplies a growing base of UK customers who heat their homes and businesses with sustainable wood pellets rather than fossil fuels.

This study seeks to quantify Drax Group's economic impact in the UK by approaching it from three distinct and separate perspectives:

- (1) examining the benefits, in terms of GDP and jobs, arising from its **power generation activities in 2015**;
- (2) measuring the economic impact of the investment programme that was carried out **to transform Drax into a biomass-fuelled generator**; and,
- (3) estimate the **wider 'catalytic' impacts of Drax's biomass conversion**. These encompass the economic activities attributable to the conversion, but which took place outside of Drax Group itself.

1.4 OUR APPROACH

Oxford Economics assessed the economic benefits of Drax Group using a standard means of analysis, called an economic impact assessment. This approach is applied in each of the three stages of the study.

Within each of these modules, three 'core' channels of impact are considered: termed the direct, indirect and induced impact. These can be understood as follows:

- Its *direct impact* relates to the Group's own activities, such as the GDP it generates and its direct employment. When assessing the impact of investment (as in the latter two areas of the study) the direct impact describes the output and jobs supported among firms directly contracted to deliver the investment programmes. This includes construction, as well as the businesses providing other inputs such as manufactured goods, transportation and technical services;

³ The economic impact of Drax Biomass Inc., Drax's subsidiary based in the United States, falls outside the remit of this study.

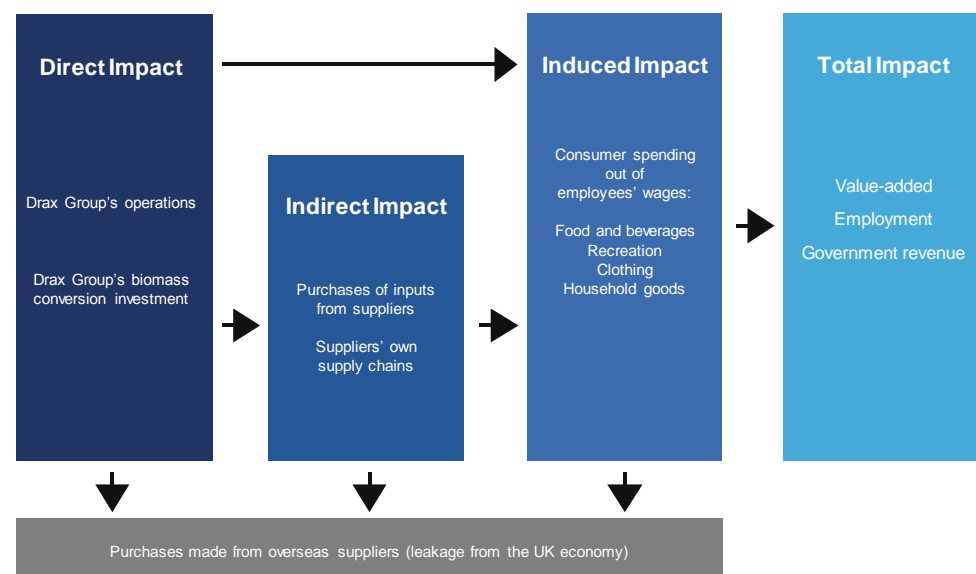
- Its *indirect impact* encapsulates the activity and employment supported in the Group's, or contractors' supply chains as a result of their procurement of goods and services; and,
- Its *induced impact*, comprising the wider economic benefits that arise when employees within the Group and contractors, and their supply chain spend their earnings, for example in local retail and leisure establishments.

These economic impacts can be measured in one of three ways:

- *GDP*, or more specifically, the Group's gross value added (GVA) contribution to GDP;
- *Employment* meaning the number of people employed, measured on a headcount basis; and,
- *Tax revenue*, the estimated fiscal contribution resulting from corporate activity and employment sustained by the Group.

The calculations undertaken to quantify these impacts draw upon data supplied by Drax Group and its partner organisations. The modelling is conducted using an Input-Output (I-O) based model of the UK economy, and regional modules describing the economies of its constituent nations and regions. This model was constructed by Oxford Economics, using macroeconomic, employment and tax data published by the Office for National Statistics (ONS) and HMRC.

Fig. 1: The channels of Drax Group's economic impact



2. THE IMPACT OF DRAX GROUP'S OPERATIONS

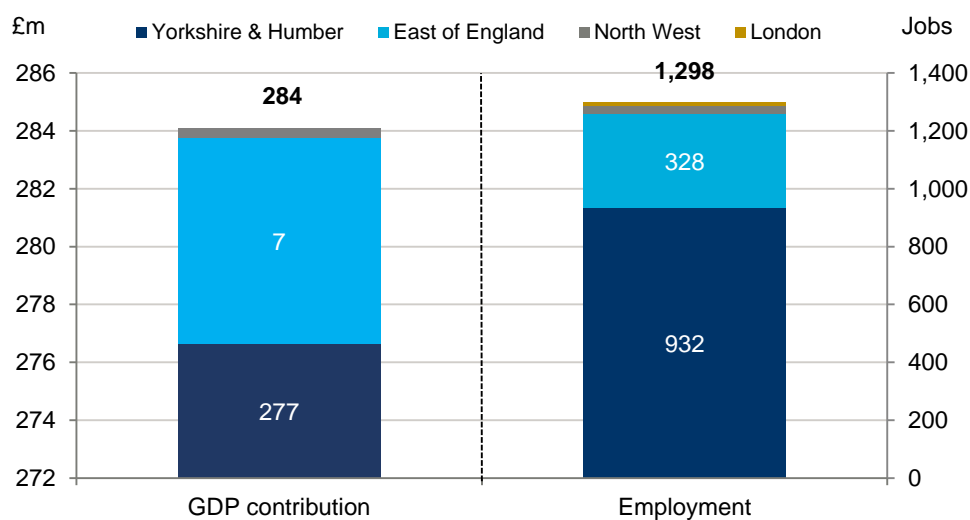
2.1 DIRECT IMPACT OF DRAX GROUP

In 2015, Drax Group's consolidated revenue was over £3 billion as it supplied around eight percent of the UK's electricity. Its earnings before interest, taxation, depreciation and amortisation (EBITDA) was £169 million. Whilst both these measures are standard indicators of a business's performance, they do not capture the true economic impact of the Group on the UK. Instead, the contribution any business makes to a country's economy can be measured by its gross value added (GVA) contribution to GDP. A commonly used method for calculating a company's GVA is by adding the incomes different parts of the economy (primarily labour and owners of capital) derive from the firm's activities. In the case of Drax Group, the contribution it makes to UK GDP is the combination of its consolidated UK-based profit and the wage and salary payments the Group makes to its employees in the UK.

Using this measure Drax Group **contributed £284 million to UK GDP in 2015**. The vast majority—£277 million—of this was located in the Yorkshire and Humber region, where the bulk of the Group's operations are located. The region is home to 932 of the Group's 1,298 UK employees.

However, other regions also directly benefited from the Group's operations. The activities of Haven Power contributed over £7 million to the East of England economy, and supported 328 jobs in the region. Similarly, Billington Bioenergy's facility in Liverpool led to a small direct contribution to the North West economy and supported 25 jobs there. Fig. 2 provides a breakdown of these impacts.

Fig. 2: Distribution of Drax Group's direct impact in 2015



Source: Oxford Economics

Totals may not sum due to rounding

The Group's operations also directly benefit the finances of the UK government. Taxes levied on its activities—such as corporation tax, business rates, carbon costs and the Waste Levy—delivered a fiscal contribution of £77 million for the Exchequer in 2015. A further £31 million raised through employee Income Tax and National Insurance Contributions took the Group's **direct contribution to UK government revenues to £108 million.**

2.2 INDIRECT IMPACT OF DRAX GROUP

In addition to this direct impact, the Group's operations create wider impacts that ripple through the rest of the economy. In the first instance, these emerge through the purchases it makes from its suppliers. These purchases support GDP and jobs among those suppliers, and also transmit demand throughout their own supply chains, an effect known as Drax Group's indirect impact.

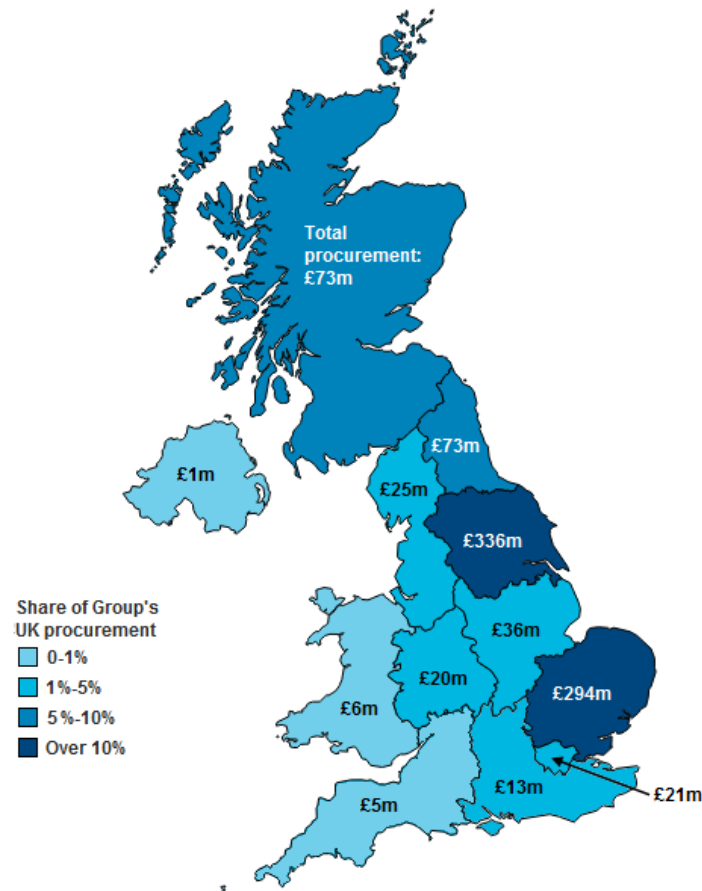
Our calculation of this impact uses a model that maps the links between sectors throughout the UK's regional and national economies. By combining this model with data on the purchases Drax Group makes from domestic suppliers, we calculate the scale and spatial distribution of Drax's entire supply chain in the UK.

The value of Drax Group's spending with its suppliers exceeded £1.8 billion in 2015.⁴ **Over £900 million, roughly half of this amount, was spent on suppliers in the UK,** with over a third of this sum accounted for by suppliers based in Yorkshire and the Humber. Purchases within this region included four-fifths of Drax's domestic coal supplies, as well as tens of millions of pounds spent with engineering and construction contractors, suppliers of technical machinery and components, transportation operators and business services providers. A further £300 million was spent in the East of England, where Haven Power is based.

As illustrated by Fig. 3, all UK regions and nations accounted for some of the Group's immediate suppliers, with Northern Ireland receiving the smallest portion of the Group's spend.

⁴ This figure excludes the cost of power buy backs, and spending by the Group's USA operations.

Fig. 3: Drax Group's procurement, by region, 2015

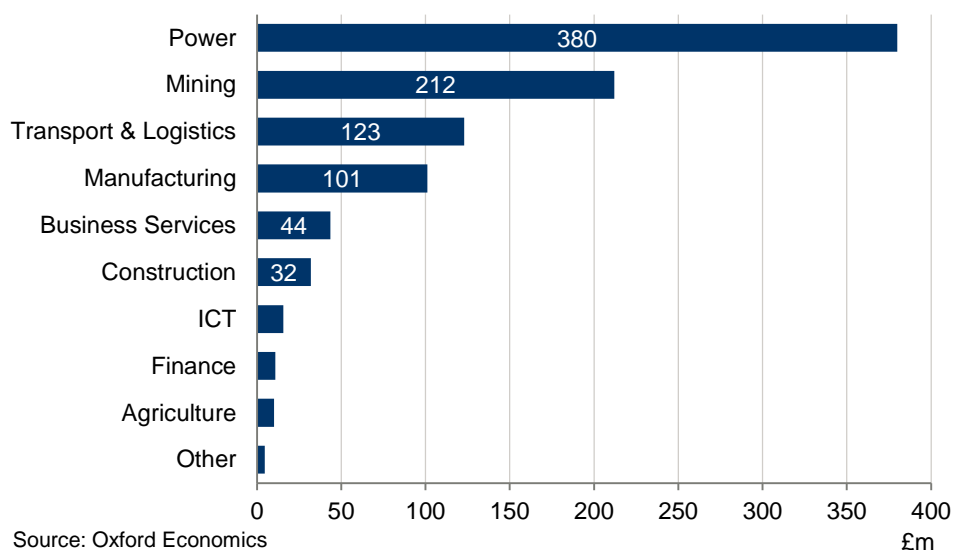


As is typical for an energy business of its scale, Drax procures a broad range of good and services from UK suppliers. These include:

- Mining: The UK coal industry played a significant part in Drax's coal procurement in 2015, accounting for 46% of total coal usage at the power station.
- Transport and logistics: Drax's operations are underpinned by a sophisticated supply chain that has pushed the boundaries of British rail engineering.
- Manufacturing: The successful operation and maintenance of Drax Power Station requires thousands of purpose-built and designed industrial components.
- Business services: Drax works with a range of professional service providers, including independent auditing of their biomass sustainability.
- ICT: Drax Group and its subsidiaries are reliant on a complex network of IT systems and platforms for the day-to-day running of their businesses.

Fig. 4. provides an illustrative breakdown of sector-by-sector spend.

Fig. 4: Drax Group's UK procurement in 2015, by sector



SUPPLY CHAIN IN PRACTICE: WH DAVIS

WH Davis was originally formed in 1910, initially as a repairer and later a manufacturer of wooden-bodied mineral wagons. It is now the last independent British freight wagon manufacturer, with workshops located just off the M1 motorway near Mansfield, Nottinghamshire. WH Davis currently employs 150 staff, including about 50 at its subsidiary business, Davis Wagon Services, based in Immingham, Lincolnshire.

In 2012, Drax entered into a partnership with WH Davis and Lloyds Register London to design and manufacture specially designed biomass rail freight wagons to transport compressed wood pellets to Drax Power Station. Together the companies have pushed the boundaries of rail engineering, using innovative design techniques and modern technology to create a rail wagon 30% larger than anything else operating on the UK rail network.

225 wagons have been produced by WH Davis for Drax thus far, representing one of the most significant projects for the company in recent years. According to Mark Jackson, Managing Director of the company, **“The Drax contract has been very important to us as a business. In 2015 alone, the production of the biomass wagons required around 1,500 man-weeks of work. It also provided a boost for our supply chain, such as our steel profile supplier based in Rotherham. The ongoing servicing of the wagons employs eight full-time employees, with another 15 indirectly supporting it.”**

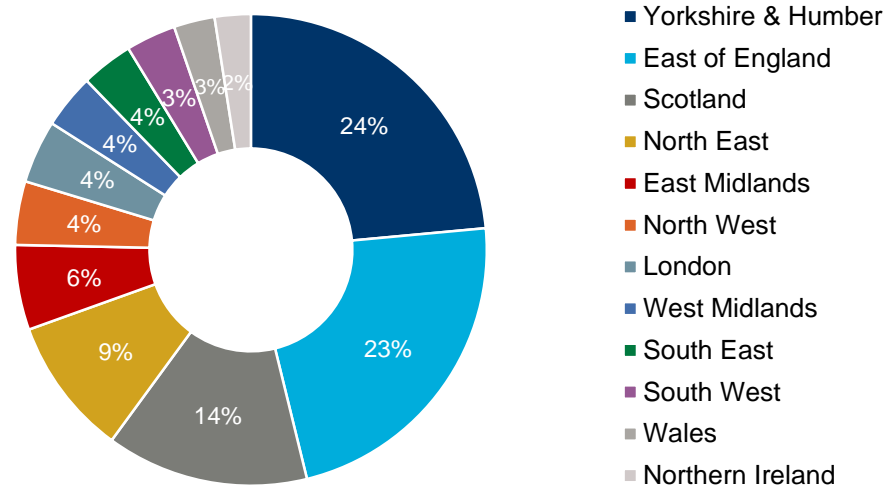
By purchasing from UK suppliers, Drax also stimulates economic activity in those businesses and along their respective supply chains. For example, an engineering firm working for Drax may source tools or parts from other UK suppliers or use the expertise of a sub-contractor. Taking these impacts into consideration, **the purchases made by the Group supported an estimated value-added contribution to the UK economy of £650 million in 2015. This also supported employment to the tune of 7,700 jobs in 2015.**

Two regions—East of England, and Yorkshire and Humber—accounted for nearly half of the GDP contribution derived from the Group's UK spending. Fig.

5 breaks down how the supply chain impact in 2015 was felt across the UK's nations and regions.

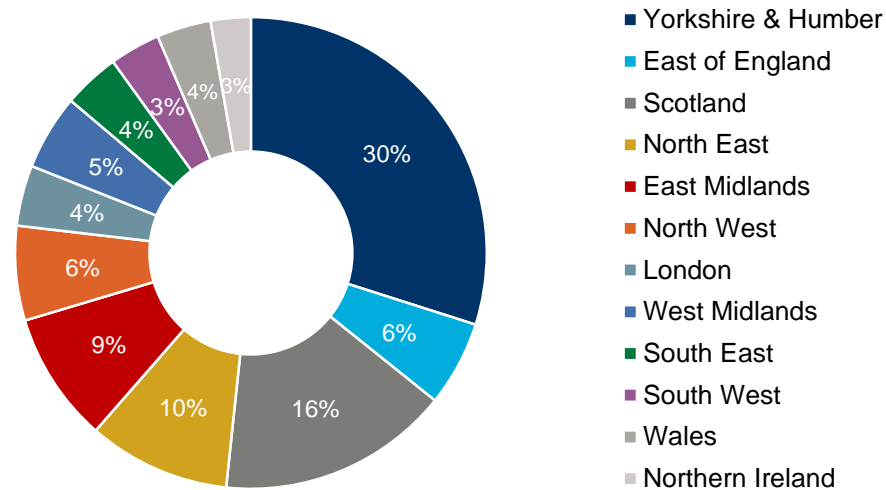
Fig. 5: Regional distribution of Drax Group's indirect impact, 2015

Contribution to GDP



Source: Oxford Economics

Contribution to employment



Source: Oxford Economics

The activity supported in Drax Group's supply chain also contributed revenue to the UK government. Businesses in its supply chain are liable to corporation tax and other taxes on production and products. Equally, the people employed in these businesses pay income tax and National Insurance Contributions. Considering all of these taxes, **we estimate the Group's UK supply chain activities raised almost £220 million for the Exchequer in 2015.**

2.3 INDUCED IMPACT OF DRAX GROUP

The spending of people working for Drax Group, or in its supply chain, forms the final channel through which it influences the UK economy. Employees will make purchases at retail and leisure outlets throughout the UK. These

purchases will generate further activity in these sectors' supply chains, adding value, sustaining employment and raising tax revenues.

We estimate that **the wage-financed spending of the people employed directly and indirectly by Drax Group across the UK in 2015 supported a value-added contribution to UK GDP of £310 million**. This activity is estimated to have sustained a further 5,100 jobs in the UK, and generated nearly £105 million for the Exchequer.

2.4 TOTAL CONTRIBUTION OF DRAX GROUP

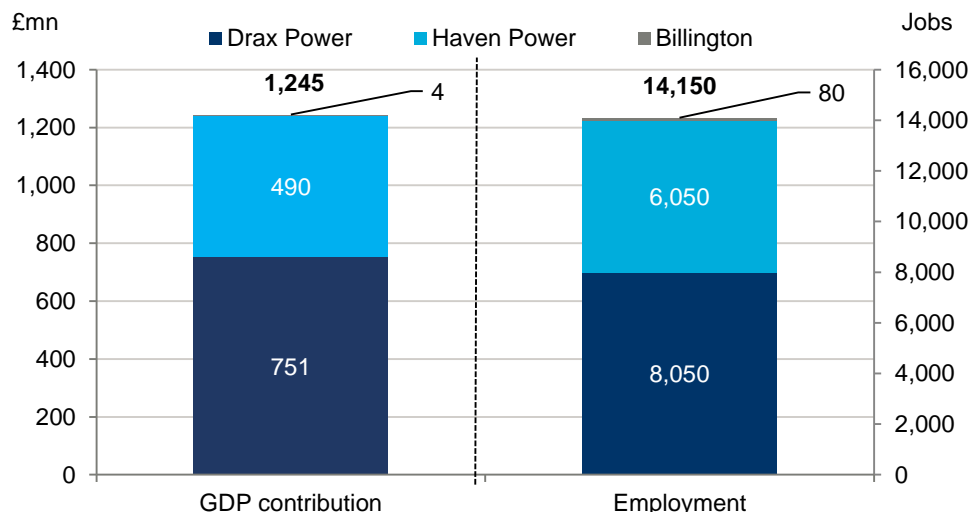
The total economic impact of Drax Group is the sum of the direct, indirect and induced impacts. Combining the three channels of impact means **the Group made a total value-added contribution to the UK economy of over £1.2 billion in 2015**.

The Group sustained 14,150 jobs in 2015. Given the capital-intensive nature of the Group's operations, and its high productivity, the employment it supported represented a smaller share of total employment in the UK than its share of GDP. Nonetheless, one in every 2,300 jobs in the UK is attributable to Drax Group's operations in 2015.

The activity and employment supported by the Group generated a considerable amount in tax revenue for the UK Exchequer. **Drax Group's operations raised an estimated £430 million in tax revenue**. This is equivalent to the annual salaries of nearly 16,500 nurses or 12,900 teachers.

Nearly two-thirds of the Group's impact is the result of Drax Power's activities. The operations of Haven Power account for the majority of the remainder, with Billington Bioenergy also making a contribution.

Fig. 6: Total Drax Group impact in 2015, by entity



Source: Oxford Economics

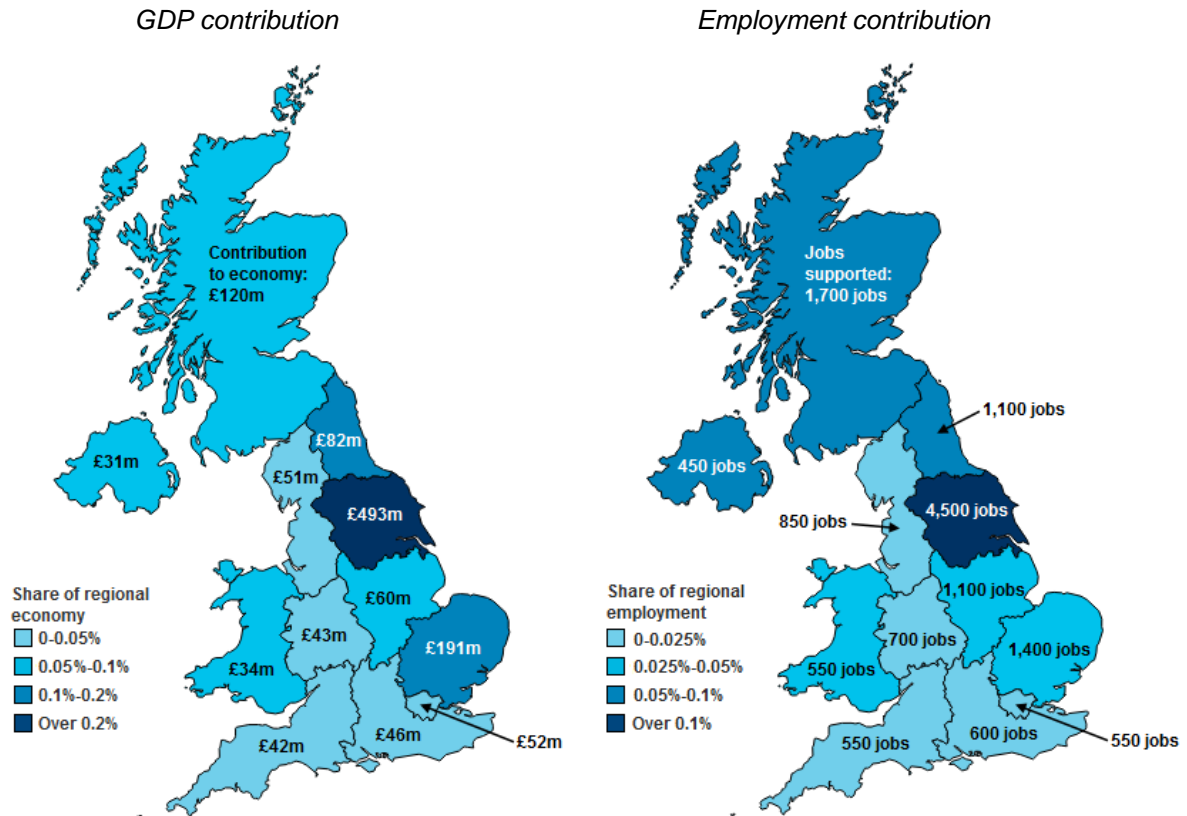
Note: numbers may not sum due to rounding

With the group predominantly based in Selby, unsurprisingly the Yorkshire and Humber region is the prime beneficiary of Drax Group's operations. Some 40 percent of the GDP created, and almost a third of the employment sustained by

the Group's operations was located in the region. Consequently, the Group's impact accounted for nearly 0.5 percent of the region's economy and 0.2 percent of its employment.

The UK's other regions benefit from Drax Group too. About 15 percent of the Group's GDP contribution was located in the East of England. Moreover, nearly 0.2 percent of the North East economy is attributable to the Group's operations.

Fig. 7: Drax Group's total impact across the UK, 2015



3. THE IMPACT OF DRAX POWER STATION'S BIOMASS CONVERSION

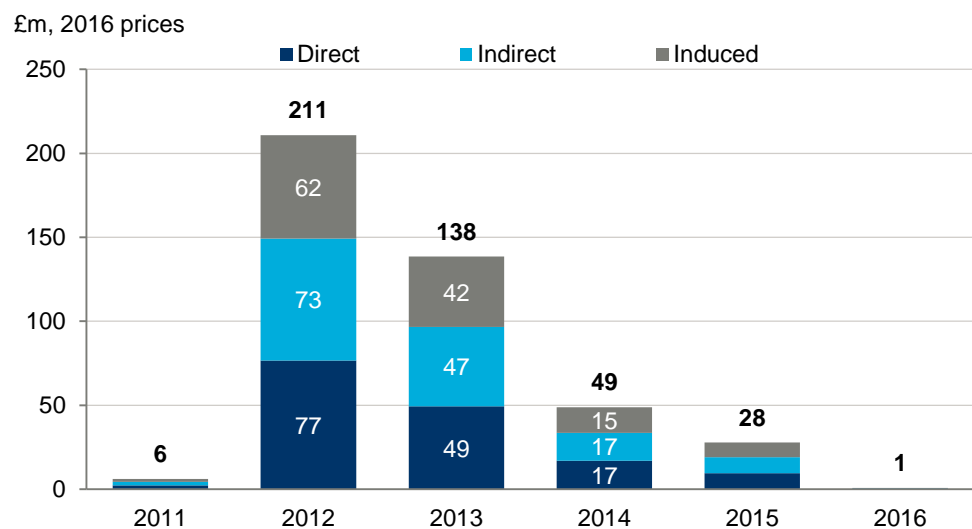
The impact of Drax Group on the UK economy extends beyond that which emerges from its day-to-day activities, explored in Chapter 2. This chapter quantifies the economic contribution that resulted from upgrading and converting three of its six generating units to biomass.

This decarbonisation project has to date spanned a six-year investment programme, totalling £365 million of capital expenditure by Drax Group in the UK. Works included modifications to the power plant, the development and installation of new control and safety systems, and the construction of state-of-the-art facilities to receive and store huge volumes of wood pellets.

3.1 THE CONVERSION'S GDP CONTRIBUTION

Over the years 2011 to 2016, the **conversion works generated a cumulative £433 million in GDP** throughout the UK economy, measured in constant 2016 prices. Fig. 8 provides an estimated breakdown of the project's direct, indirect and induced impacts on a yearly basis.

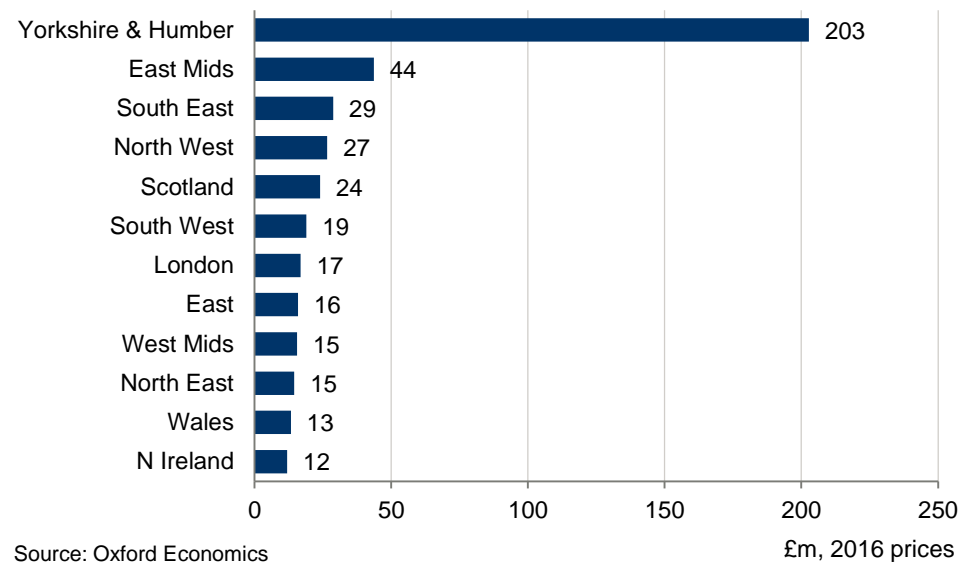
Fig. 8: GDP contribution of Drax Power Station's biomass conversion, 2011-2016



Source: Oxford Economics

The impact has been concentrated heavily in the Yorkshire and the Humber region, due to the significant role played by local suppliers throughout the investment programme. About three-quarters of all Drax Group's capital spending accrued to contractors based in the Yorkshire region, including important suppliers such as Spencer, Clyde Bergemann and Diamond Power. Fig. 9 illustrates this regional spread.

Fig. 9: Cumulative GDP contribution of Drax Power Station's biomass conversion, by region, 2011-16



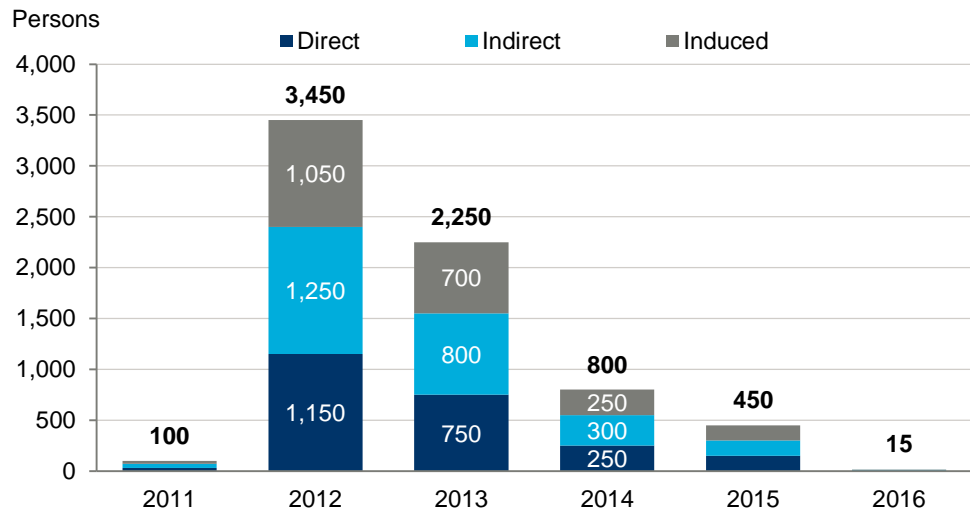
These local sourcing decisions lead to Yorkshire and the Humber accruing **just under half (47 percent) of the investment's entire GDP impact. This equates to over £200 million** when measured in 2016 prices.

3.2 THE CONVERSION'S EMPLOYMENT CONTRIBUTION

This scale of economic activity, concentrated over the few years during which the works took place, created sizeable demand for labour. Excluding any of Drax Group's own workers whose time was devoted to the project, **the conversion supported over 7,000 annual jobs** through the three channels of impact.⁵ Fig. 10 provides an illustrative breakdown of these employment opportunities on a year-by-year basis.

⁵ One annual job refers to the employment of one person for one calendar year. The count of jobs supported in each year are summed, and discussed in aggregate. This is due to the unequal distribution of the employment impact. For example, annual averages would be skewed by data from 2011 and 2016, where very few jobs were supported.

Fig. 10: Employment supported by Drax Power Station's biomass conversion, 2011-2016

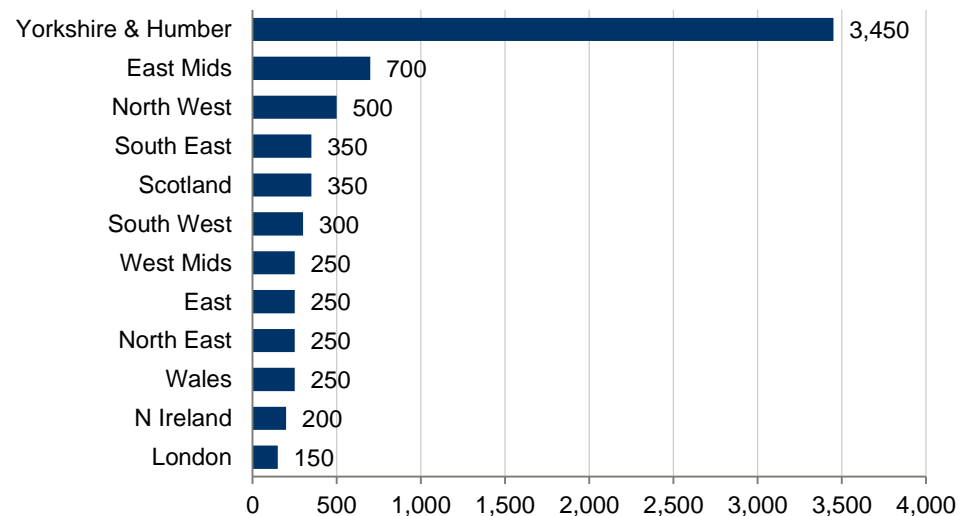


Source: Oxford Economics

Due to the complexity and scale of the conversion project, much of the employment impact was felt within industrial sectors. This means that a large proportion of the jobs supported by the conversion comprised capital-intensive and highly productive work. Almost half of the impact (49 percent of annual jobs) occurred within the construction, manufacturing and transport industries.

When examining how these jobs were distributed across the UK, it is clear that again Yorkshire and the Humber enjoyed the lion's share of the conversion's employment benefits. **Almost 3,500 annual jobs were supported here**, equivalent to an average of 580 workers per year. Fig. 11 provides a detailed breakdown of jobs supported on a region-by-region basis.

Fig. 11: Annual jobs supported by Drax Power Station's biomass conversion, by region, 2011-2016



Source: Oxford Economics

Annual jobs

3.3 THE CONVERSION'S FISCAL CONTRIBUTION

The conversion can be thought of as an economic stimulus, involving both local production and further activity within supply chains stretching across the UK and beyond.

This production yields tax revenues through many different channels. One is the corporation tax on company profits attributable to the work. Another includes the income tax and National Insurance payments, collected on behalf of the workers whose jobs were supported by the programme during this period. Moreover, the wage-financed consumption of these workers generates product taxes such as VAT.

In total, the conversion's contributed **£118 million in tax revenues to the Exchequer**, when measured in constant 2016 prices. By way of comparison, these revenues are equivalent to the annual salaries of 3,000 police officers, or 1,800 doctors.

4. CATALYTIC BENEFITS OF DRAX POWER STATION'S CONVERSION

Chapter 3 quantified how Drax Group's own investments for the conversion impacted upon the UK's national and regional economies. However, restricting the scope of our analysis to the investment funded or executed by Drax Group would amount to a partial picture of its economic impact.

This is because the conversion required the development of an expansive, specialised freight and logistics infrastructure dedicated to the import, storage and delivery of (primarily) compressed wood pellets. This infrastructure was not built by Drax Group alone, but rather in concert with partners such as port operators, freight service providers and wagon suppliers. As such, many other companies also undertook considerable investments attributable to Drax's decarbonisation.

This chapter will explore the economic impact of the investments in biomass import infrastructure carried out by the Port of Tyne, the Port of Liverpool, and the Humber ports of Immingham and Hull. Each of these investments involved large capital expenditure, requiring extensive manpower and generating a significant economic footprint.⁶ It will also consider economic activity supported within the freight providers GB Railfreight and DB Cargo, who manage the delivery of biomass from these ports to the Drax Power Station in Selby.

4.1 PORT INVESTMENTS

Handling biomass shipments requires the development of highly specialised structures and equipment. The material must be kept dry at all times from its unloading from ships, to its distribution into silo storage, and its loading into rail wagons that also must be securely covered. Wood pellets are also fragile, with careless handling creating excessive dust, degrading its quality and increasing the risk of combustion. These factors mean building the necessary port infrastructure is a highly complex technical task, requiring dedicated equipment, skilled labour and expertise.

This section outlines how such resources were deployed throughout northern England in support of Drax's decarbonisation process.

4.1.1 Port of Tyne

Port of Tyne began its preparations to receive biomass shipments in 2009, after entering a long-term agreement with Drax. As an existing partner of Drax, and with much of power plant's coal imports passing through its facilities, the Port of Tyne was well placed to meet the demand for biomass emerging through Drax's conversion.

⁶ In this chapter, the catalytic economic impact will be presented in aggregate (i.e. including all companies) due to potential commercial sensitivity. They are also only presented at a national level, due to unavailability of regional-level data associated with these investment programmes.

Some £16 million was invested to construct a biomass handling facility equipped to process two million tonnes per year, with rail loading capacity. In addition, dredging works were undertaken to deepen water in its berths for the larger vessels delivering biomass.

The first wood pellet vessel arrived at Port of Tyne in September 2010, and in the time since they have handled over six million tonnes of the fuel. This has supported activity at the Port against a backdrop of increasingly challenging market conditions for coal.

The revenues contributed by biomass have also helped to underpin further investments at the Port (both biomass-related and otherwise), which may not have been financially viable without the business driven by Drax's demand for wood fibre sustainably sourced from abroad. These are future opportunities that will leverage the experiences built up through their partnership with Drax.

4.1.2 Port of Liverpool

In mid-2015, the Port of Liverpool kicked off a £100 million investment programme, aimed at eventually equipping the port to tranship three million tonnes of biomass fuel per year.

This programme includes a biomass terminal, specialised ship unloading equipment, as well as additional warehouse capacity, which will be used for biomass storage while dedicated silos are developed. The capital programme is estimated to have created 500 construction jobs, and the operation of the terminal itself will support over 60 direct and indirect jobs, on an ongoing basis.

The Port of Liverpool's biomass investments also involve upgrades to its road and rail infrastructure. These upgrades, aimed at enabling rail deliveries of biomass to Drax's site in Selby, will also support the Port's general shift of focus away from road transport, in favour of rail. This is expected to enhance the resilience of and efficiency at the Port, while also easing pressure on the local road network.

4.1.3 Humber Ports

The Humber ports at Immingham and Hull have also developed biomass handling capability and infrastructure in recent years. The first part of a £150 million biomass investment scheme was the construction of a specialised rail loading facility at Hull, which opened in late 2014. This is capable of processing up to one million tonnes of biomass per year.

Across the Humber, the Immingham Renewable Fuels Terminal is due to be completed later in 2016. This fully-automated terminal can receive six million tonnes of biomass imports per year, and features ship unloaders, over one kilometre of conveyors, four storage silos, and rail and road unloading facilities. Hundreds of jobs were directly supported during construction, including many among local suppliers and contractors.

Drax's conversion has underpinned these investments, with their demand for imported wood pellets helping both Humber Ports manage the declining coal volumes. Drax's partnership with the Ports also delivers additional benefits, with both parties sharing of best practise on technical issues regarding wood pellet handling, and health and safety questions. The long-term nature of the

partnership and Drax's dependable demand for biomass also provides certainty for the port authority Associated British Ports, allowing them to develop forward strategy with an additional degree of certainty.

4.2 FREIGHT CAPACITY

While the port facilities are an essential element of northern England's biomass infrastructure, another crucial requirement is having the capacity to deliver the wood pellet cargo inland to the generators. This section outlines the role of two freight service providers in delivering this capacity, with a particular focus on how Drax's operations have facilitated some of their economic contributions to the UK.

4.2.1 DB Cargo UK

For many years, the backbone of DB Cargo's UK business has been coal deliveries. However, with coal movements declining due to challenging market conditions, Drax's decarbonisation presented an opportunity to invest in biomass haulage capabilities. This included hiring many new personnel, and training new drivers.

The biomass services that DB Cargo runs between the Humber ports and the Drax site support full-time and well-remunerated employment for around 40 people. In this way, the conversion has sustained jobs and income within local communities such as Knottingley and Immingham,⁷ many of which are adapting to the consequences of declines in the coal and steel industries.

4.2.2 GB Railfreight

GB Railfreight is another company that has seen Drax's biomass volumes partially offset declines in its coal business. The partnership with Drax also provided certainty for them to invest millions in converting some of their own coal hoppers, for the haulage of biomass. At present, it is estimated that Drax's partnership with GB Railfreight supports the employment of over 80 people including drivers and crew, planners and controllers.

As more biomass is required to generate the same amount of electricity as coal, more freight must be delivered to the power station. More frequent train movements have heightened the importance of efficient scheduling and unloading. In partnership with the freight providers, Drax has implemented systems at its site to deliver this efficiency, including re-laying up to six miles of track to permit swifter passage for the trains.

These efficiencies deliver wider benefits for the region's rail system. Since Network Rail must synchronise freight trains between passenger services, any complications with freight movements have disruptive knock-on effects around the wider network.

Drax also supports GB Railfreight's training of new drivers, permitting trainee drivers to move wagons around the internal circuit on the Drax site. In this way,

⁷ These are locations of DB Cargo UK's large depot facilities.

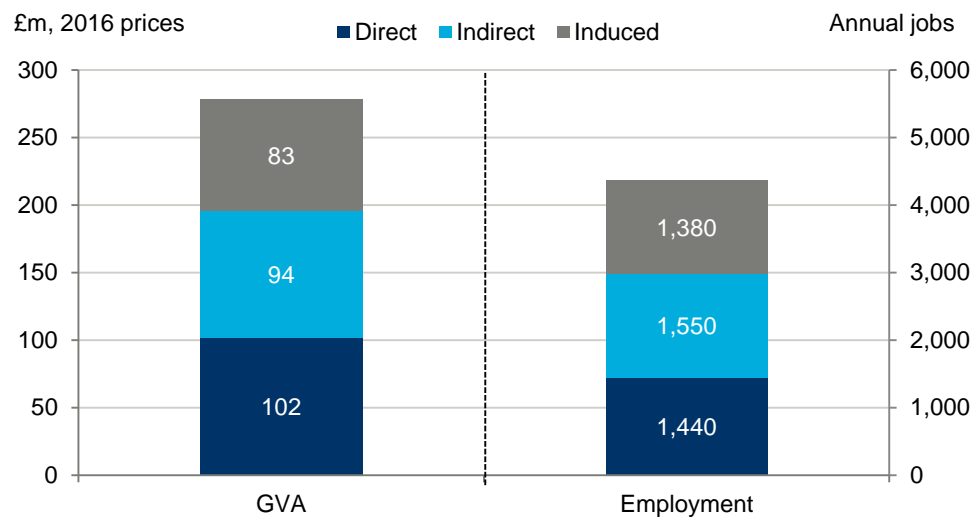
Drax's operations are supporting the development of valuable technical skills for some local workers.

4.3 THE TOTAL ECONOMIC IMPACT OF PARTNERS' INVESTMENTS

Aggregating the aforementioned investments allows us to assess the scale of 'catalysed' economic activity stimulated by Drax's conversion to biomass.

The results of this analysis are presented in Fig. 12. These headline figures encompass the investments of the ports, as well GB Railfreight's capital spending to adapt coal hoppers for biomass cargo. The economic contributions emerging from the running of freight services themselves are not included here, since they are captured in the indirect impact discussed in Chapter 2.2.

Fig. 12: Cumulative GVA and employment impact in the UK of catalysed investments, 2009-2016⁸



Source: Oxford Economics

Over the eight years to 2016, the investments undertaken by Drax Group's commercial partners in **developing the UK's biomass infrastructure contributed some £278 million to UK GDP**, measured in 2016 prices.

These **investments also supported around 4,400 annual jobs**, which is equivalent to average annual employment from 2009-2016 of 500 people. These jobs were not distributed evenly across all years, due to the 'lumpy' nature of the capital programmes. The programmes included within this analysis saw a peak employment impact of 1,700 jobs, during 2015.

This scale of economic activity also produces tax revenues. **Taxes on the transactions, profits and labour associated with these investments yielded an estimated £75 million in revenues for the Exchequer.**

⁸ In this chapter, the catalytic economic impact will be presented in aggregate (i.e. including all companies) due to potential commercial sensitivity. They are also only presented at a national level, due to unavailability of regional-level data associated with these investment programmes.

5. CONCLUSION

Drax Power Station is the UK's single largest electricity generator, capable of meeting eight percent of the nation's demand. The scale of this energy supply, sufficient to power six million homes, makes it an enormously important asset for the region and the UK.

This demonstrates how the Drax site itself is an important economic centre, delivering benefits across the wider economy through its energy production. But the economic contribution of the station's operator, Drax Group, extends far beyond this. In order to produce and sell electricity, the Group generates vast demand for inputs—from fuel to professional services—and thus sustains a vast supply chain, extending from Selby across Yorkshire, the UK and internationally. The production also contributes many millions of pounds in wage-financed spending, within local communities all over the nation. In total, its operations in 2015 gave rise to £1.2 billion in GDP and supported 14,150 jobs.

The economic benefits it delivers do not stop here, however. In pursuit of renewable and sustainable energy production, Drax Group undertook a massive investment programme to partially convert the power station to use compressed wood pellets instead of coal. It also co-operated with partner organisations across northern England, to collectively put in place the necessary infrastructure to import and transfer biomass cargo to its site in Yorkshire. In recent years these works have cumulatively added £710 million to UK GDP and sustained 11,400 annual jobs.

The economic value of Drax's dependable, dispatchable electricity is magnified in light of the challenges facing the UK's energy system. The Government has signalled its intention to phase out coal generation by 2025, and insufficient additional generation capacity is under construction. Intermittent renewable technologies like wind and solar PV are not by themselves capable of covering potential future shortfalls. Whereas Drax, powered predominantly by sustainable biomass fuel, remains able to supply wholesale electricity on demand, at a nationally-significant scale.

In this way, Drax has a crucial role to play in delivering a UK energy mix that is affordable, dependable and sustainable. It is a proven asset, using proven technology, to support the UK in moving towards a low-carbon economy. While we do not quantify these benefits in monetary terms, these features must be taken into account to gain a comprehensive appreciation of Drax's economic importance.

**Europe, Middle East,
and Africa:****Global headquarters**

Oxford Economics Ltd
Abbey House
121 St Aldates
Oxford, OX1 1HB
UK

Tel: +44 (0)1865 268900

London

Broadwall House
21 Broadwall
London, SE1 9PL
UK

Tel: +44 (0)20 7803 1418

Belfast

Lagan House Sackville Street
Lisburn
County Down, BT27 4AB
UK

Tel: + 44 (0)2892 635400

Paarl

12 Cecilia Street
Paarl 7646
South Africa

Tel: +27(0)21 863-6200

Frankfurt

Mainzer Landstraße 41
60329 Frankfurt am Main
Germany

Tel: +49 69 95 925 280

Paris

25 rue Tiphaine
75015 Paris
France

Tel: +33 (0)1 56 53 98 52

Milan

Via Cadorna 3
20080 Albairate (MI)
Italy

Tel: +39 02 9406 1054

Americas:**New York**

5 Hanover Square, 19th Floor
New York, NY 10004
USA

Tel: +1 (646) 786 1879

Philadelphia

303 West Lancaster Avenue
Suite 2e
Wayne, PA 19087
USA

Tel: +1 (610) 995 9600

Mexico City

Emerson 150, Despacho 802
Col. Polanco, Miguel Hidalgo
México D.F., C.P. 11560

Tel: +52 (55) 52503252

Boston

51 Sawyer Road
Building 2 - Suite 220
Waltham, MA 02453
USA

Tel: +1 (617) 206 6112

Chicago

980 N. Michigan Avenue,
Suite 1412 Chicago
Illinois, IL 60611
USA

Tel: +1 (773) 372-5762

Florida

8201 Peters Road,
Suite 1000
Plantation,
FL 33324
USA

Tel: +1 (954) 916 5373

Asia Pacific:**Singapore**

6 Battery Road
#38-05
Singapore 049909

Tel: +65 6850 0110

Hong Kong

30/F, Suite 3112
Entertainment Building
30 Queen's Road Central

Tel: +852 3103 1096

Sydney

Level 4, 95 Pitt Street
Sydney, 2000
Australia

Tel: +61 (0)2 8249 8286

Email:

mailbox@oxfordeconomics.com

Website:

www.oxfordeconomics.com