



**PR18 STRUCTURE OF CHARGES REVIEW  
MARKET CAN BEAR ANALYSIS  
FREIGHT SERVICES**

**REPORT FOR THE OFFICE OF RAIL AND ROAD**

---

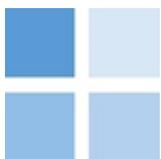
**28<sup>TH</sup> SEPTEMBER 2017**

**Final Report**

Submitted by:

**Cambridge Economic Policy Associates**

---



## CONTENTS

<b>Executive Summary .....</b>	<b>5</b>
<b>1. Introduction.....</b>	<b>8</b>
1.1. Background .....	8
1.2. Objectives of this study.....	8
1.3. Background .....	9
1.4. Approach in this study .....	9
<b>2. The FSC in PR13.....</b>	<b>11</b>
2.1. Methodology used to set the charge.....	11
2.2. ‘Market can bear’ analysis. ....	12
2.3. The FSC at PR13 .....	15
<b>3. High level review of the ongoing suitability of the PR13 methodology.....</b>	<b>16</b>
3.1. Market Segmentation .....	16
3.2. Elasticity analysis.....	17
3.3. Implications.....	18
<b>4. Key changes in PR13 to date .....</b>	<b>19</b>
4.1. Rail freight market changes .....	19
4.2. Energy market changes.....	20
4.3. Implications.....	21
<b>5. Approach to assessing the FSC by market .....</b>	<b>22</b>
<b>6. FSC for Coal.....</b>	<b>23</b>
6.1. Context.....	23
6.2. Analysis .....	25
6.3. Conclusions .....	31
<b>7. FSC for Biomass.....</b>	<b>32</b>
7.1. Context.....	32
7.2. Analysis .....	34
7.3. Conclusions .....	36
<b>8. FSC for Iron Ore .....</b>	<b>38</b>
8.1. Context.....	38
8.2. Analysis .....	39

8.3.	Conclusions .....	42
<b>9.</b>	<b>FSC for Intermodal .....</b>	<b>43</b>
9.1.	Context.....	43
9.2.	Analysis .....	43
9.3.	Conclusions .....	46
<b>10.</b>	<b>FSC for Aggregates .....</b>	<b>47</b>
10.1.	Context.....	47
10.2.	Analysis .....	47
10.3.	Conclusions .....	48
<b>11.</b>	<b>FSC for Nuclear Waste.....</b>	<b>49</b>
11.1.	Context.....	49
11.2.	Analysis .....	49
11.3.	Conclusions .....	49
<b>12.</b>	<b>Summary.....</b>	<b>50</b>
12.1.	Recommendations .....	50
12.2.	Wider considerations.....	51
<b>Annex A – Confidential analysis of the intermodal market [Redacted] .....</b>		<b>52</b>

## **DISCLAIMER**

This report has been commissioned by the Office of Road and Rail (ORR) from Cambridge Economic Policy Associates (CEPA) Ltd and SYSTRA Ltd for the exclusive use of ORR. However, the views expressed are those of CEPA and SYSTRA alone.

Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been independently verified, unless otherwise expressly indicated. Public information, industry, and statistical data are from sources we deem to be reliable; however, we make no representation as to the accuracy or completeness of such information, unless expressly indicated. The findings enclosed in this report may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties.

The opinions expressed in this report are valid only for the purpose stated herein and as of the date of this report. No obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

CEPA Ltd and SYSTRA Ltd do not accept or assume any responsibility in respect of the Report to any readers of the Report (Third Parties), other than the client. To the fullest extent permitted by law, CEPA Ltd and SYSTRA Ltd will accept no liability in respect of the Report to any Third Parties. Should any Third Parties choose to rely on the Report, then they do so at their own risk.

CEPA Ltd and SYSTRA Ltd reserve all rights in the Report.

© All rights reserved by Cambridge Economic Policy Associates Ltd and SYSTRA Ltd

## EXECUTIVE SUMMARY

### Context and approach

The ORR is now in the process of undertaking the 2018 Period Review (PR18) which will culminate in the determination of what Network Rail must deliver within the next Control Period (CP6) and a review of the structure of access charges (SoC). Access charges are fees paid by train operators to gain use of the rail network.

One area of the charges review will involve examining how fixed network costs are recovered from both passenger and freight train operators. The PR13 review considered a contribution to fixed costs being made by freight flows and as a result, a new freight specific charge (FSC) was implemented on certain freight flows in CP5. This charge was created around the concept of identifying markets within freight that could bear a charge.

The ORR has commissioned CEPA to review changes in the various freight markets that have occurred since the 2013 Periodic Review (PR13) and to assess the impact of those changes on the ability to bear the FSC<sup>1</sup>. There are several strands to the analysis:

- Understanding the current FSC and the approach taken by ORR at PR13.
- Considering, at a high level whether there is any evidence to suggest that the fundamentals of the approach – segmentation, elasticities - should be changed.
- Identifying key trends that have occurred to date in PR13.
- Considering on a commodity-by-commodity basis whether there is evidence to suggest that markets could ‘bear’ the FSC in CP6.

The review has been largely top down and qualitative in nature but informed by evidence of market changes and input from rail and wider stakeholders.

### The Freight Specific Charge (FSC)

The FSC is a ‘mark-up’ on the variable usage charge (VUC), based on an analysis of what the ‘market’ can bear - consistent with The Railways (Access, Management and Licensing of Railway Undertakings) Regulations 2016 (‘2016 Regulations’)<sup>2</sup>. In line with its 2008 approach to assessing the ability to bear the Freight Only Lines’ charge, in the PR13 determination ORR:

- Defined markets by commodity – coal, construction (mainly the transport of aggregates), intermodal.
- Undertook analysis of whether markets could bear a charge, underpinned by elasticity of demand analysis.

---

<sup>1</sup> In accordance with ORR’s Charges and Contractual Incentives Conclusions (June 2017), the current FSC and the Freight Only Lines (FOL) charge are to be merged in CP6. When we refer to the FSC we include all charges levied as a mark-up and recovering fixed costs i.e. reference to the FSC should be read to cover the FOL.

<sup>2</sup> Implementing European Commission 2012/34 Directive.

- Selected the markets that would bear the charge.
- Established a rolling programme of introduction, subject to caps on the overall level of the charge by commodity.

### CP5 Methodology review

Our scope of work does not require a review of the methodology applied in CP5. Our work has instead focussed on whether the markets, defined for CP5, can bear a charge in CP6. We have however undertaken a high-level review of the approach to assess whether there is any evidence to support a change to the methodology. We:

- Consider market segmentation; and
- Cross-check MDST's elasticity analysis by looking for alternative sources of evidence, given that the elasticity of a market is a key aspect of ability to bear.

In relation to **market segments**, we consider it a prudent approach to roll forward to PR18 the market segments used in PR13. Whilst there are possible exceptions e.g. within intermodal and aggregates, we do not have the level of evidence required to suggest defining further market segments based on geographic characteristics.

In relation to commodity-specific **elasticities**, we were unable to directly review the underlying MDST analysis for reasons of confidentiality, but the wider evidence that we did locate does not overtly contradict MDST's previous results, and therefore provides some confidence that the PR13 approach could be rolled-forward to PR18.

### Recent market changes

Two of the commodities moved by rail – coal and biomass – have experienced a significant change in market conditions in recent years. Therefore, we consider in more detail how these changes may have impacted each market's ability to bear a FSC, as well as looking forward to potential trends/impacts in CP6.

We also consider evidence which suggests that some intermodal flows may be relatively inelastic, the recent growth in aggregates transported and the decline in the volume of steel moved by rail, and the implications these changes have on ability to bear.

### Recommendations

Based on our analysis we make the following recommendations:

**Coal.** On balance, there seems to be more evidence in favour of the market's ability to bear the FSC – or rather, to continue to bear a charge that not, given it is already in place in CP5. Whilst demand for rail transport of coal may be becoming slightly more elastic over time (at the margin), it is still likely to be relatively inelastic for longer flows. The difference in costs between coal and gas generation appears fairly large, so the FSC (which is a small proportion of total generation costs) is unlikely to impact coal's position in the UK energy generation

merit order. Finally, removing the FSC for coal would be inconsistent with the Government environmental policy to phase out coal in the near future.

**Biomass.** There are some good arguments in favour of the (current) market participants' ability to bear the FSC, particularly the inelasticity of demand for rail from the Drax and Lynemouth plants, and the likely profitability of biomass generation for these plants (in light of Government subsidies). For potential future investors, the availability of subsidy appears to be of far greater significance (in terms of magnitude) than a potential biomass FSC. Whilst it is difficult to be wholly definitive, because we do not know the precise operating costs of the Drax and Lynemouth plants, the considerable sunk investment in rail infrastructure undertaken suggests that the level of commitment to rail freight by these plants is high, and therefore on balance we consider (albeit with some caution) that the market is likely to be able to bear a FSC.

**Iron ore.** There are a number of reasons why a FSC for iron ore is likely to still be appropriate – competition from other modes remains very low for the main flow of iron ore (Immingham to Scunthorpe), Network Rail has been encouraged by the UK Government to continue buying steel from British Steel, and the impact of the FSC is likely to be marginal in relation to the overall production costs of steel. There is also the upcoming significant opportunity presented by HS2. We do note that the UK steel industry has experienced lower profitability in recent years, but it is unlikely that the iron ore FSC has played anything more than a marginal role in that.

**Intermodal.** Whilst there is some evidence that certain intermodal flows could bear a charge ORR would need strong evidence of further market segments (e.g. based on geographic characteristics) if it wanted to justify applying the FSC to parts of the intermodal market, given the need to ensure that charges are not unduly discriminatory. Whilst there is some evidence available, this is relatively limited in comparison to the threshold that would be required in order to justify a FSC. Further investigation and analysis would be required to overcome this hurdle. In addition, a FSC for intermodal rail freight would be inconsistent with the Government's existing MSRS scheme, which subsidises intermodal rail freight costs.

**Aggregates.** The sensitivity of aggregates flows with respect to a number of factors (price, macroeconomic conditions, and government policy), along with road being relatively cost effective, suggests that demand for rail freight transportation is relatively elastic, and therefore ability to bear an additional charge is low.

**Nuclear.** The safety-critical nature of nuclear waste transportation means that transportation via any mode other than rail is extremely unlikely in the near future. Given that the FSC is effectively a governmental transfer between NDA and Network Rail, its impact appears marginal.

## 1. INTRODUCTION

### 1.1. Background

The ORR is now in the process of undertaking the 2018 Period Review (PR18) which will culminate in the determination of what Network Rail must deliver within the next Control Period (CP6) and a review of the structure of access charges (SoC). Access charges are fees paid by train operators to gain use of the rail network. Setting charges is an important part of aligning incentives in the GB rail industry, and ensuring that train operating companies (TOCs) and other operators are incentivised to make the best use of existing capacity on the network.

One area of this charges review will involve examining how fixed network costs are recovered from both passenger and freight train operators, with ORR recently saying that it will “work towards levying charges to recover fixed network costs on **all** operators”, (emphasis in original).<sup>3</sup>

This project reviews the freight work undertaken in PR13 and seeks to extend the market can bear concept to passenger flows.

### 1.2. Objectives of this study

The overall project, which has been split into passenger and freight work streams, will form a continuation of the work completed by ORR on the structure of costs and charges review, undertaken in PR13. **This report focuses solely on the freight elements of the work.**

The PR13 review considered a contribution to fixed costs being made by freight flows and as a result, a new freight specific charge (FSC) was implemented on certain freight flows in CP5. This charge was created around the concept of identifying markets within freight that could bear a charge. ORR has commissioned CEPA to review changes in the various freight markets that have occurred since PR13, and to assess the impact of those changes on the ability to bear the FSC<sup>4</sup>.

Reflecting the need to balance the potential for change against the duty to create predictability in charges, ORR asked us to take a proportionate approach focussing on markets where significant change has occurred since the FSC commenced implementation. This short report presents the findings of our top down, and largely qualitative, review of the operation of the charge and changes in markets since the charge was established, as part of the PR13 determination for CP5.

In developing our views, we have been assisted by the RDG PR18 Working Group and wider stakeholders including DRAX and British Steel.

---

<sup>3</sup> ORR, Charges and contractual incentives – consultation conclusions, June 2017

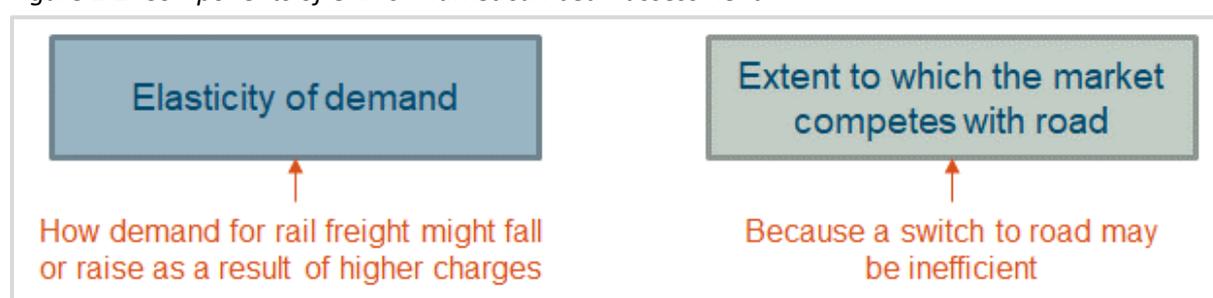
<sup>4</sup> In accordance with ORR’s Charges and Contractual Incentives Conclusions (June 2017), the current FSC and the Freight Only Lines (FOL) charge are to be merged in CP6. When we refer to the FSC we include all charges levied as a mark-up and recovering fixed costs i.e. reference to the FSC should be read to cover the FOL.

### 1.3. Background

The FSC is an access charge levied on the transport of certain commodities – in CP5, it has been levied on coal used to generate electricity (ESI Coal), iron ore and waste from nuclear power plants. It is levied only on markets that ORR has deemed can ‘bear’ a charge, i.e. if there is not a “*significant risk that the mark up could result in the exclusion of use of the infrastructure by the market segment*”.<sup>5</sup>

ORR policy has been that ‘bearing’ the charge requires that both the price elasticity of demand for rail transportation by that market is relatively low, and that the propensity to switch to road (or other transportation modes) is also low. The latter will impact the former – if road is not a viable substitute, demand for rail will be more inelastic.

Figure 1.1: Components of ORR’s ‘market can bear’ assessment



Source: CEPA representation of ORR’s principal assessment criteria<sup>6</sup>

The FSC is levied in addition to the variable usage charge (which is levied on all freight transport), and provides a contribution towards fixed costs – it is analogous to the fixed charge levied on franchised passenger TOCs, in that it recovers fixed network costs. The aim of the FSC is to enable Network Rail to recover a greater proportion of the costs of freight transport, by applying an additional charge to markets that are able to bear it.

The FSC – which is being introduced gradually during the current price control period (CP5) – was set in 2013. In this report, we review how the FSC was calculated, focusing on the ‘market can bear analysis’ undertaken during the last periodic review, and undertake a high level updated ‘market can bear’ analysis to inform setting the FSC for PR18. To do this we identify and analyse the different markets served by freight e.g. coal, biomass, etc. For these markets, we consider the price elasticity of demand for freight transport, competition from other modes, and whether the market is likely to remain profitable if an FSC is applied.

### 1.4. Approach in this study

As noted above, the objective of this study is to advise ORR on the FSC for PR18 by revisiting its previous ‘market can bear’ analysis, and considering market changes since then. There are several strands to achieving this objective:

<sup>5</sup> Periodic Review 2013: Consultation on the Variable User Charge and on a Freight Specific Charge, May 2012

<sup>6</sup> Ibid.

- Understanding the current FSC and the approach taken by ORR for CP5 – discussed in Section 2.
- Considering, at a high level whether there is any evidence to suggest that the fundamentals of the approach – segmentation, elasticities - should be changed – discussed in Section 3.
- Identifying key trends that have occurred to date in PR13 since the current FSC was set – discussed in Section 4. We consider changes in freight rail flows, as well as trends in the UK electricity generation industry (given that a number of freight commodities are integral in the GB electricity mix).
- Considering on a commodity-by-commodity basis, whether there is evidence to suggest that these markets could ‘bear’ the FSC in CP6. In Section 5, we set out the framework within which we have undertaken this commodity-by-commodity analysis. Subsequently, in Sections 6 to 11, we present our analysis by individual commodity, which includes coal, biomass, iron ore, intermodal, aggregates and nuclear waste.
- In Section 12 we present our recommendations on the ability of different markets to bear a FSC in PR18. In this section we also note issues raised by stakeholders which, although not directly within the scope of a ‘market can bear’ assessment, may be relevant considerations for the PR18 determination.

## 2. THE FSC IN PR13

The FSC is a 'mark-up' on the variable usage charge (VUC) based on an analysis of what the 'market' can bear - consistent with the 2016 Regulations. Consistent with its 2008 approach to assessing ability to bear the Freight Only Lines' charge, in the PR13 determination ORR:

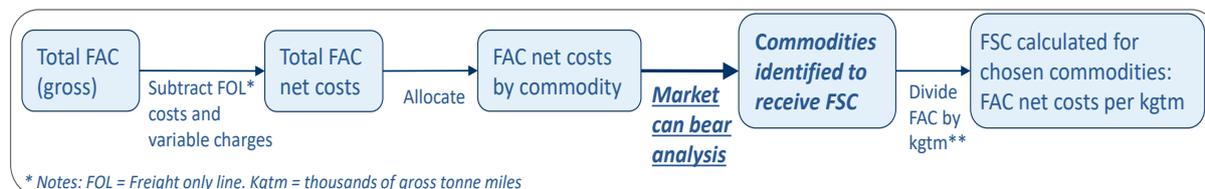
- Defined markets by commodity – coal, construction (mainly the transport of aggregates), intermodal, etc.
- Undertook analysis of whether markets could bear a charge, underpinned by elasticity of demand analysis. The demand analysis of different markets considers both distance (rail is most cost-efficient over longer distances) and ease of transfer to competing modes (primarily road). This work was undertaken for ORR by MDS Transmodal (MDST). Elasticities were derived based on MDST's previous analysis, contained in a confidential model, and draw upon its professional experience and judgement.
- Selected the markets that would bear the charge.
- Established a rolling programme of introduction, subject to caps on the overall level of the charge by commodity.

This section briefly discusses the analysis undertaken in PR13 and its conclusions.

### 2.1. Methodology used to set the charge

It is our understanding that ORR followed the process described below in setting the charge<sup>7</sup>:

Figure 2.1: ORR's methodology to calculate the FSC



Source: CEPA interpretation of ORR's CP5 process for setting the FSC

ORR's analysis started from an estimate of Freight Avoidable Costs (FAC) – the costs that would be avoided in the long run (over 35 years<sup>8</sup>) if freight traffic did not use the network. The level of FAC was initially estimated by L.E.K. for Network Rail. ORR and Network Rail then jointly commissioned Arup to review that calculation, before ORR requested L.E.K. to make revisions.<sup>9</sup> The estimate of FAC changed substantially through this process – the final value used for total FAC (gross) was £278-400m per annum. The largest component of FAC (more

<sup>7</sup> This is a simplified version of the process for ease of understanding. We note that there were more complex considerations and interactions at all stages.

<sup>8</sup> [http://orr.gov.uk/\\_data/assets/pdf\\_file/0009/1341/lek-slides050712.pdf](http://orr.gov.uk/_data/assets/pdf_file/0009/1341/lek-slides050712.pdf)

<sup>9</sup> <https://www.networkrail.co.uk/wp-content/uploads/2017/02/Arup-review-of-LEK-report-to-estimate-freight-avoidable-costs.pdf>  
<https://www.networkrail.co.uk/wp-content/uploads/2017/02/NR-letter-LEK-report-on-freight-avoidable-costs.pdf>

than half) comes from savings on track maintenance because freight trains are heavy and generate more track wear than lighter faster passenger trains.

From this total number, ORR subtracted costs that overlapped the estimate of FAC, such as variable charges (the Variable User Charge (VUC etc.)), and costs associated with freight only lines which were the subject of a separate charge. This resulted in an estimate of net costs which were then allocated by commodity. The market can bear analysis was used to assess the impact of a charge to recover (a proportion) of these costs (by commodity) on that market, and determined whether the market could bear the charge. The FSC was then determined for the commodities found to be able to bear the charge.

## 2.2. 'Market can bear' analysis.

As noted above the 'market can bear' analysis was undertaken to select those markets deemed able to bear the FSC. It involved:

- 1) Market identification: Identifying/understanding all markets that use freight transportation.
- 2) Elasticity: For each market, considering the price elasticity of demand for freight transport, i.e. versus road.
- 3) Market impacts: Considering the potential impact of applying the FSC, e.g. on traffic by market segment.

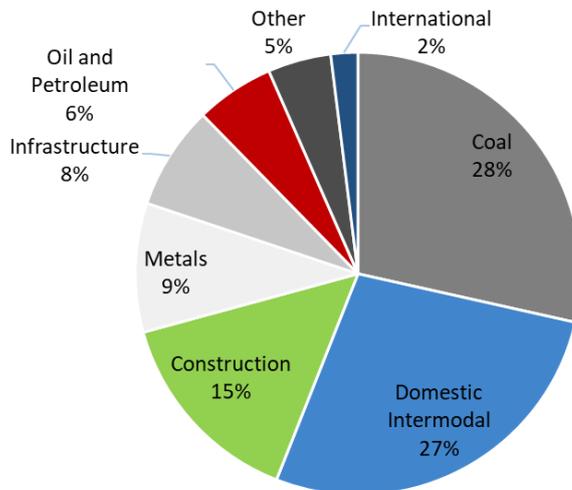
These three aspects are discussed below.

### Market identification

At PR13 the following markets were identified: electricity supply industry (ESI) coal; Iron Ore; Metals; Petroleum and chemicals; Intermodal; Automotive; Spent Nuclear fuels; General Distribution; and Premium mail and logistics.

At the time of the last review, coal—particularly that travelling to power stations—represented the biggest single freight flow, closely followed by domestic intermodal. However, coal volumes were forecast to fall over time as the UK moved towards meeting its climate change targets. Construction and Metals were the next largest flows, with oil and petroleum, international, and other, which includes biomass, accounting for small shares of the overall freight market.

Figure 2.2: Average for the period 2010 – 2012: Rail freight moved by commodity in Great Britain" (% of billion net tonne kilometres)



Source: ORR data portal (accessed June 2017): "Freight moved by commodity"

### Price elasticity of demand for freight rail transport by commodity

#### Analysis by MDST

MDST used its 'GB Freight Model' (validated by the Department for Transport) to calculate the following elasticities by commodity, and to estimate the corresponding impact on traffic volumes of applying the charge.

Figure 2.3: MDST: Elasticities with respect to track access charges (TAC)

Commodity	Mean length of haul (km)	TAC per tonne (£)	TAC % of rail cost *	Elasticity: Tkm wrt rail cost	Elasticity: Tkm wrt TAC
Maritime containers to/from ports	362	1.29	12% (8%)	-2.5	-0.32
- of which deep sea ports	368	1.31	13% (8%)	-2.6	-0.32
- of which short sea ports	270	1.01	11% (6%)	-2.3	-0.24
Coal	165	0.78			
- of which power station coal	170	0.81	25%	-0.1	-0.02
- of which other coal	106	0.38	11%	-0.3	-0.03
Metals	195	0.70	15%	-0.7	-0.11
Ore	41	0.19	7%	0.0	0.00
Other minerals	161	0.58	14%	-4.1	-0.55
Auto	328	1.23	15%	-1.0	-0.15
Petroleum & Chemicals	208	0.74	16%	-1.2	-0.19
Waste	112	0.40	11%	0.0	0.00
Domestic intermodal/wagonload	364	1.35	13% (8%)	-1.8	-0.23
-of which Nuclear	307	2.79	9%	0.0	0.00
Mail/Prem logistics	530	2.46	24%	-1.2	-0.28
Own haul (Network Rail)	189				0.00
Channel Tunnel	306	1.15	11% (7%)	-1.0	-0.12
<b>Grand Total</b>	<b>189</b>	<b>0.71</b>	<b>17%</b>	<b>-1.3</b>	<b>-0.21</b>

\* Percentages in brackets show the TAC % if the rail cost includes the cost of one local road haul in the case of intermodal traffics. Rail costs include handling/terminal costs.

Source: MDST (Nov 2006): 'Impact of track access charge increases on rail freight traffic'

The MDST report showed that transportation of nuclear waste, ores and coal was fairly insensitive to the charge. For nuclear this is because it is only moved by rail (for safety reasons). However, at the other end of the spectrum, the impacts on domestic intermodal and international container traffic were estimated to be large, as was the impact on the aggregates market. For these markets, the opportunity to shift to road was far greater.

### Analysis by NERA

In relation to coal, energy market modelling by NERA for PR13 found that demand for coal was “quite insensitive to the FSC”.<sup>10</sup> NERA’s 2012 report estimated that an increased charge of £5 per thousand net tonne km (or £4 per thousand gross tonne miles) would result in a 2.4% reduction in the amount of coal (net tonne km) moved.<sup>11</sup> NERA also found that increasing track access charges would have a “negligible impact” on demand for the transport of nuclear fuel, but that it is “more difficult” to assess the impact on biomass.<sup>12</sup>

### Market impact of applying a FSC

Taking advice from both MDST and NERA, and taking into account relevant legislation and its statutory duties, ORR concluded that the charge would be applied to ESI coal, iron ore and nuclear waste but not to other markets (including biomass). Its conclusions are summarised below:

**Coal.** ORR emphasised NERA’s findings (above) that an FSC would likely have “little impact” on demand for coal, although ORR did recognise that future demand for coal was subject to high levels of uncertainty, e.g. due to rising uptake of renewables and movement of international gas prices. Nonetheless, ORR’s analysis concluded that “demand for ESI coal is highly inelastic with respect to track access charges”.<sup>13</sup>

**Iron ore.** At PR13, iron ore traffic was a single flow,<sup>14</sup> from the Port of Immingham to Tata Steel’s plant at Scunthorpe. MDST’s analysis found that road transport for iron ore would be around three times the cost of rail transport, so the level of substitutability was very low. ORR noted the difficult climate for UK steel production, but as the FSC would only increase the cost of iron ore by a small amount (just 0.2%), ORR determined that it was unlikely to have a significant adverse impact on the market.

**Nuclear waste.** A 2012 report suggested that a £5 increase in spent nuclear fuel TAC would result in a 0.3% decrease in margins.<sup>15</sup> Given the lack of potential to switch, ORR determined that the FSC would be applied to flows of nuclear waste.

---

<sup>10</sup> ORR, *PR13: Conclusion on the average variable usage charge and a freight specific charge*, Jan 2013, p.66-67.

<sup>11</sup> NERA, *The Impact of Changes in Access Charges on the Demand for Coal Report for ORR*, May 2012, p.iii

<sup>12</sup> *Ibid.* p.iv

<sup>13</sup> ORR, *PR13: Conclusion on the average variable usage charge and a freight specific charge*, Jan 2013, p.69

<sup>14</sup> *Ibid.* p.70

<sup>15</sup> NERA, *The Impact of Changes in Access Charges on the Demand for Coal Report for ORR*, May 2012, p.26

**Biomass.** ORR initially indicated that there would be no biomass charge in CP5 given the early stage of development of the market. However advice based on analysis from MDST, suggested that a charge similar to that proposed for ESI coal would still leave transport by rail cheaper than transport by road, and not have a material impact on demand for rail haulage. An exception was identified for smaller plants, but it was suggested that biomass already tended to arrive at these plants by road. Ultimately however, there remained significant concern about potential unexplored/unknown impacts and stakeholders were concerned that DECC (now BEIS) had set its subsidy levels without reference to increases in access charges<sup>16</sup>. As a result, ORR concluded that the charge would not be introduced for biomass in CP5, but that the position would be reviewed for CP6.

### 2.3. The FSC at PR13

ORR determined caps for the level of the FSC for these three commodities. Given ongoing industry concern about the effect of the new charge, ORR agreed a rolling programme of implementation, the details of which were developed by Network Rail. The caps and implementation profile for CP5 are set out below:

Figure 2.4: Freight specific charge cap determined by ORR through CP5 (per kg<sub>tm</sub>, 2011-12 prices)

Commodity	14-15	15-16	16-17	17-18	18-19
ESI coal	£0.00	£0.00	£0.80	£2.40	£4.04
Spent nuclear fuel	£0.00	£0.00	£2.15	£6.98	£11.64
Iron Ore	£0.00	£0.00	£0.59	£1.77	£2.96
Implementation (%)	0%	0%	20%	60%	100%

**Notes:**

£/kg<sub>tm</sub> = £ per thousands of gross tonne miles, in 2011/12 prices.

Figures are in 2011/12 prices, as presented in ORR's PR13 determination.

The FSC is being phased in over PR13, as shown by the implementation percentages.

ESI = Electricity Supply Industry

Source: Based on ORR's Final determination for PR13<sup>17</sup>

The phasing in of the FSC commenced in 2016-17 and the full level of the charge will not be in place until 2018-19. As such, it is early to draw conclusions on real world impacts.

<sup>16</sup> <http://orr.gov.uk/rail/consultations/closed-consultations/pr13-consultations/freight-specific-charge-for-biomass>

<sup>17</sup> <http://orr.gov.uk/rail/economic-regulation/regulation-of-network-rail/price-controls/periodic-review-2013/pr13-publications/final-determination>

### 3. HIGH LEVEL REVIEW OF THE ONGOING SUITABILITY OF THE PR13 METHODOLOGY

Our scope of work does not require a review of the methodology being applied in CP5. Our work is focussed on whether the markets defined for CP5 can bear a charge in CP6. However, we have undertaken a high level review of the approach to assess whether there is any evidence to support a change to the methodology. In this section, we therefore:

- Consider market segmentation.
- Cross-check MDST's elasticity analysis by looking for alternative sources of evidence, given that the elasticity of a market is a key aspect of ability to bear.

#### 3.1. Market Segmentation

Identifying markets with reference to commodities – as per the PR13 approach – allows for a relatively objective approach that is practicable within the existing charging system. Rolling forward the existing market definitions from PR13 to PR18 would have the advantage of maintaining consistency between price controls, which is regulatory best practice, and which freight stakeholders have indicated is helpful from their perspective. It also sits well with ORR's duty to create predictability in charging.

Consistent with taking a proportionate regulatory approach, we have sought to prioritise our analysis by focusing on areas that have the greatest potential to change compared to PR13. The main potential areas for change relate to intermodal freight and aggregates. ORR's preliminary view as part of its competition investigation in relation to Freightliner Limited<sup>18</sup> was that some parts of the intermodal market are less price sensitive to freight charges than others, due to the degree to which they compete with road. This means that it is theoretically possible to define further market segments based on geographic characteristics, and apply a charge at a more granular level. We consider that the same may be true of aggregate flows, e.g. there seems to be particularly high demand currently from the South-East of England, which is increasing longer distance flows over which rail tends to dominate.

Our review of intermodal markets within this study was high-level, aimed at establishing whether there is strong a case for defining such further market segments. ORR has highlighted that our analysis was undertaken in a different context than a competition investigation; the considerations around defining further market segments for the purpose of charging being different from those in a competition case.

Evidence to support more granular charging (i.e. further market segments based on geographic characteristics) is limited at this point in time. Our discussions with stakeholders suggest wider considerations, such as prices being set on a portfolio basis, would need to be taken into account. ORR has also previously stated that its approach would be a "*consistent*

---

<sup>18</sup> In December 2015, ORR published a decision to accept commitments offered by Freightliner Limited and Freightliner Group Limited ('commitments decision'). See [http://orr.gov.uk/\\_data/assets/pdf\\_file/0011/20351/orr-commitments-decision-2015-12-18.pdf](http://orr.gov.uk/_data/assets/pdf_file/0011/20351/orr-commitments-decision-2015-12-18.pdf).

*approach across market segments*". In addition, we note the additional complexity and potential impracticality of seeking to vary the charge across more granular market segments (e.g. based on geography), and on balance conclude that there is no strong case to change the current market definitions.

### **3.2. Elasticity analysis**

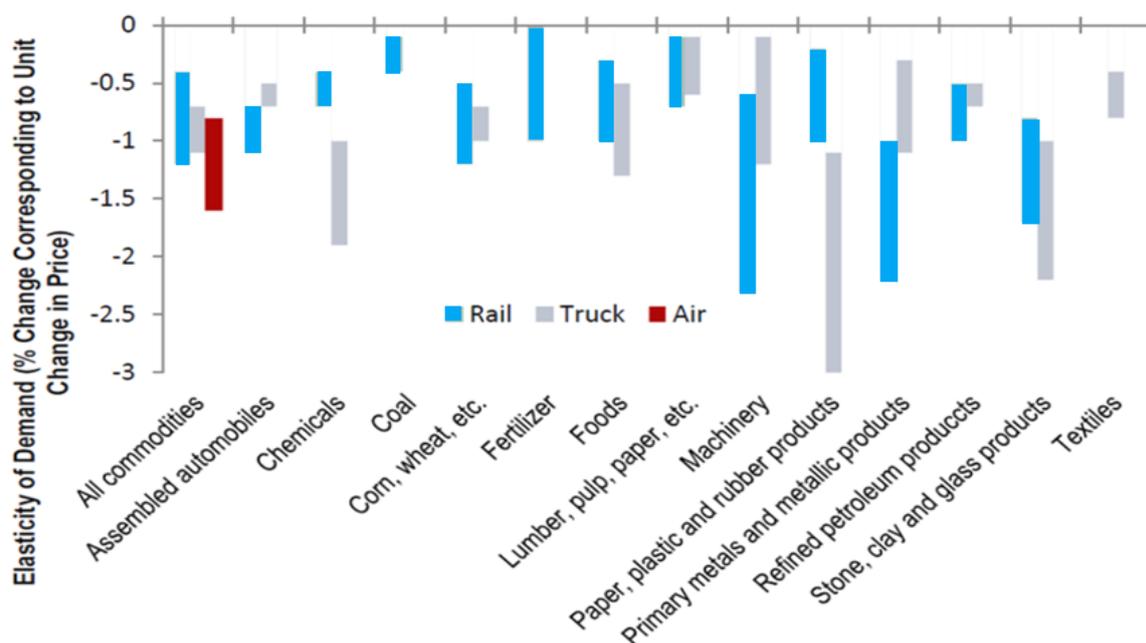
The application of the charge to coal, iron ore and nuclear waste rests on MDST's analysis of the elasticity of the commodity based markets that were defined by ORR. MDST's estimates come from a mode share model, not available to CEPA, in which the elasticities deduced are strongly dependent upon assumptions that reflect MDST's professional experience and judgment embedded in that model. This is particularly relevant for the elasticity calculations, which were central to the 'market can bear' analysis undertaken for PR13. This suggests a need for cross-checking where practicable. We have therefore considered other available studies, and the degree to which they reach the same conclusions as MDST.

#### **Literature Review**

Publicly available data on elasticities has been difficult to come by. The best source that we have identified is a literature review by Clark et al. (2005), which compiled statistics on the elasticity of demand based on data from Canada and USA. The results are shown below, presented as the 'most likely range' of price elasticities of demand for different types of freight transport, for different commodities. Rail elasticities are shown with the blue bars.

It should be noted that the data is based on studies which are not recent, and which use data from Canada and the USA, rather than the UK, so national differences are likely to be a feature. We also do not have access to the underlying data and so we cannot adjust for the differing aggregations of commodities. While the underlying economics of the sectors are likely to be similar in relation to the MDST work, overall the data should be considered indicative rather than precisely comparable to MDST's analysis.

Figure 3.1: Clark et al (2005): ‘Most likely’ range of price elasticities of demand for freight transport



Source: Clark et al. (2005)<sup>19</sup>

For several commodities, the values in Figure 3.1 above are close to MDST's values (shown in Figure 2.3 further above), which gives confidence in the MDST analysis. For example, in both cases coal is highly inelastic (close to zero in both cases), and petroleum and chemicals are similar (-0.5 to -1.0 above, versus -1.2 for MDST).

There does not however, seem to be a direct comparator for the shipping containers and aggregates markets. Similarly, as shown in Figure 2.3 further above, MDST found the elasticity of 'ore' to be zero (i.e. highly inelastic), but there is not a direct comparator from Clark et al.

### 3.3. Implications

In relation to market segments, we consider it a prudent approach to roll forward the PR13 market segments to PR18. Although there are possible exceptions – intermodal and aggregates –we do not have the level of evidence to suggest making changes to markets given the wider consideration that we set out above. We discuss this issue in more detail in Section 9 (for intermodal) and Section 10 (for aggregates).

In relation to commodity-specific elasticities, the available evidence does not overtly contradict the work previously undertaken by MDST, and therefore provides some confidence that the PR13 approach could be rolled-forward to PR18. However, given we were unable to directly review the underlying MDST analysis, we are unable to reach a firm conclusion.

<sup>19</sup> <http://www.nrel.gov/docs/fy13osti/55636.pdf>. Originally from Clark et al., *A Survey of the Freight Transportation Demand Literature and a Comparison of Elasticity Estimates*, 2005.

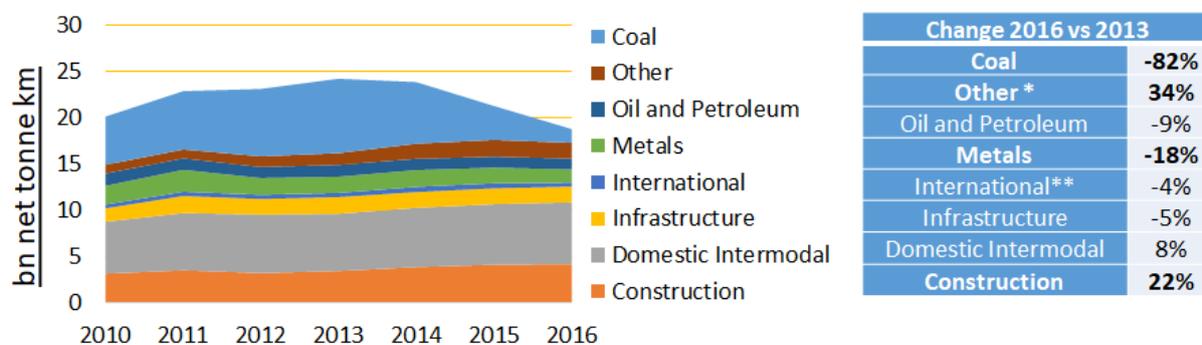
## 4. KEY CHANGES IN PR13 TO DATE

In this section, we consider changes within the rail freight market and in the market for UK electricity generation – the latter impacts on several commodities transported by rail. These trends provide useful context in terms of the ability of different commodity based markets to bear a charge. For example, changing demand patterns for different commodities within the market for UK energy generation could change the impact of FSC over time, and therefore the market’s ability to bear it.

### 4.1. Rail freight market changes

The figure below shows the change in rail freight flows over time, both as a trend (left hand chart) and the percentage change in flows between 2013 and 2016 (right hand table).

Figure 4.1: Rail freight moved by commodity (bn net tonne km)



\* Other includes biomass, ore, industrial minerals, domestic waste, chemicals nuclear waste and automotive.

\*\* Although not confirmed, we suspect that ‘Channel tunnel intermodal’ is included in international  
Source: ORR data portal (accessed June 2017): “Freight moved by commodity”

Our key observations on the figure above are:

- As expected, there has been a significant fall in coal flows since 2013. This has occurred more rapidly than was anticipated by ORR’s forecasts for PR13, and result from significant changes in the wider energy market – namely EU/UK policy interventions, greater and earlier reliance on renewable sources, and the fall in the price of gas.
- The loss of coal has reduced the size of the freight market overall, although there are some growth sectors.
- ‘Other’ flows have increased noticeably, primarily driven by the growth of biomass. Biomass rail freight flows were 0.9 bn net tonne km in 2016/17 – a rise of 133% since 2013/14 (source: Network Rail). This growth in biomass is discussed in Section 7.
- Construction (aggregates) flows have also increased, as has intermodal, whilst metal flows have fallen.

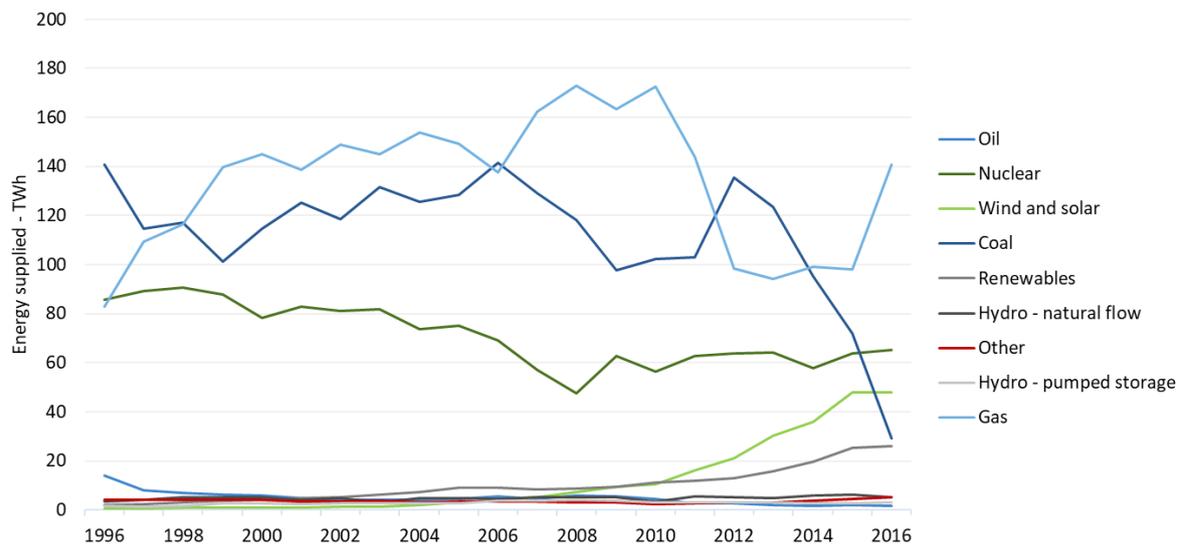
## 4.2. Energy market changes

The UK market for energy generation has changed in recent years for a number of reasons:

- With growth in renewables, aided by Government subsidies, the electricity generation market is going through significant transformation. Wind, solar, and biomass have all increased their share of UK electricity generation;
- From discussions with stakeholders, we understand that a large proportion of biomass (for the purposes of electricity generation) is transported by rail;
- Demand for coal has been falling quickly, as coal has fallen out of the 'merit order' – the ranking of electricity technologies by marginal costs which indicates the order in which technologies are likely to be dispatched in response to increasing demand. As such, coal is no longer guaranteed to be used constantly for electricity generation.<sup>20</sup> As noted above, the fall in coal has been driven by EU/UK policy interventions, greater and earlier reliance on renewable sources, and the fall in the price of gas – this is discussed further in Section 6.
- Demand for coal has been partially displaced by gas (due to falling gas prices) and by biomass (due to the availability of Government subsidies, e.g. Drax has converted three of its coal units to biomass).

The figure below shows how the sources of UK electricity generation have changed in recent years.

Figure 4.2: UK electricity supplied by generation type (TWh)



Source: Digest of UK Energy Statistics (DUKES) 2016 Table 5.6

<sup>20</sup> 10<sup>th</sup> May 2016 was the first time since 1882 that electricity generation from coal dropped to zero for an entire day, with an increase in wind, solar, and nuclear power alongside lower overall electricity demand. <https://www.ft.com/content/8f65f54a-26a7-11e7-8691-d5f7e0cd0a16>

### **4.3. Implications**

Two of the commodities moved by rail – coal and biomass – have experienced a significant change in market conditions in recent years. Therefore, in subsequent sections, we consider in more detail how these changes may have impacted each market’s ability to bear a FSC, as well as looking forward to potential trends/impacts in CP6.

## 5. APPROACH TO ASSESSING THE FSC BY MARKET

In the following sections, we consider each of the relevant markets in turn:

- Coal (Section 6), which is charged the FSC in CP5.
- Biomass (Section 7), which is a growing sector. It was not charged the FSC in CP5, but ORR committed to review its eligibility in PR18.
- Iron ore (Section 8), which is charged the FSC in CP5.
- Intermodal (Section 9), which is a heavy freight user (by net tonne km moved), but has not been charged the FSC in CP5.
- Aggregates (Section 10), which is also a heavy freight user (by net tonne km moved).
- Nuclear waste (Section 11), which is charged the FSC in CP5.

In our discussion of each of these markets, we start by providing context, including relevant information about the sector and recent trends in the freight flows for that commodity. We then provide our analysis on the ability of that market/commodity to bear a charge, considering a number of different factors as outlined below (although not all of these factors are relevant to all markets):

- Competition from other modes.
- Relevant aspects of the market within which that commodity sits, e.g. biomass and coal are sources of fuel within the wider-UK electricity generation market, so their respective competitiveness within the electricity market is relevant to their ability to bear the FSC.
- Demand-side market dynamics, e.g. specific characteristics of the end customer that might affect ability to bear.
- Any evidence on either the actual (observed) impact of the FSC on the market to date, or the likely future impact if a charge were to be levied.
- The potential existence of further market segments (e.g. based on geographic characteristics) within a particular commodity.

Although not directly relevant to a market can bear test, we also consider wider Government policy as a cross-check on whether levying (or removing) the FSC in CP6 for a market would be consistent with existing Government priorities, because ORR may wish to factor these points into its decisions for CP6.

Finally in each section, we provide our recommendations around the market's ability to bear a FSC during the next control period.

## 6. FSC FOR COAL

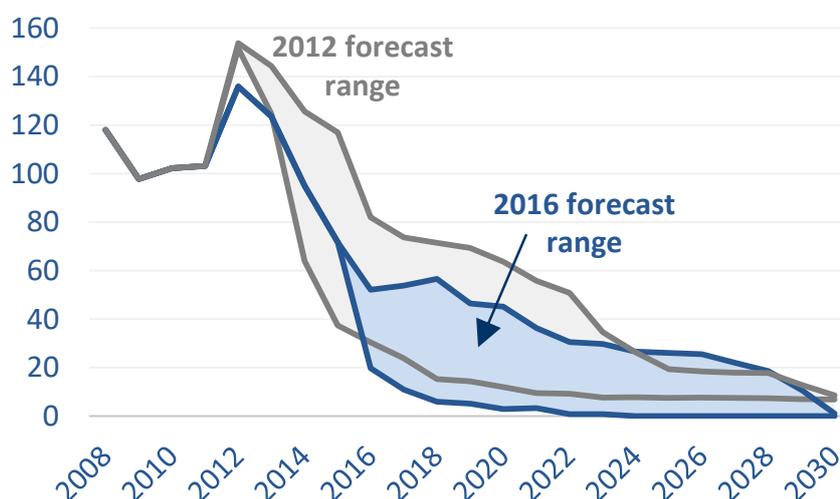
### 6.1. Context

#### Demand for coal by power stations

Demand for coal has fallen significantly in recent years, driven by gas becoming relatively cheaper, displacing coal in the UK's 'merit order', and due to EU and UK Government policy to phase out coal, e.g. the Large Combustion Plant Directive (LCPD), the Industrial Emissions Directive (IED) and UK carbon price support.

The 2012 forecast was surrounded by a high degree of uncertainty (e.g. as forecasts relied upon the assumed uptake of renewables, the movement of gas prices, etc.). The actuals (up to 2016) stayed within the mid-to-low end of the forecast range. The 2016 forecast demonstrates a shift to less electricity generation through coal, but still with a wide range.

Figure 6.1: BEIS forecast ranges for electricity generated from coal (TWh)



Source: BEIS<sup>21</sup>

In terms of the near future, the UK Government has been clear that coal will be phased out shortly, with the UK's remaining coal-fired power stations due to be closed by 2025. Some stakeholders suggested that this will occur even sooner. For example, analysis by Imperial College London found that coal supplied just 2% of the UK's power in the first half of 2017.<sup>22</sup> The remaining uncertainty therefore, is the speed at which coal is phased out over the next few years.

<sup>21</sup> BEIS 2013 and 2016 releases of the "energy and emission projections". The range depends on the forecasted range of fossil fuel prices, which affects the fuel mix of UK electricity generation.

<sup>22</sup> <https://www.theguardian.com/business/2017/jul/19/how-coal-lost-power-britain>

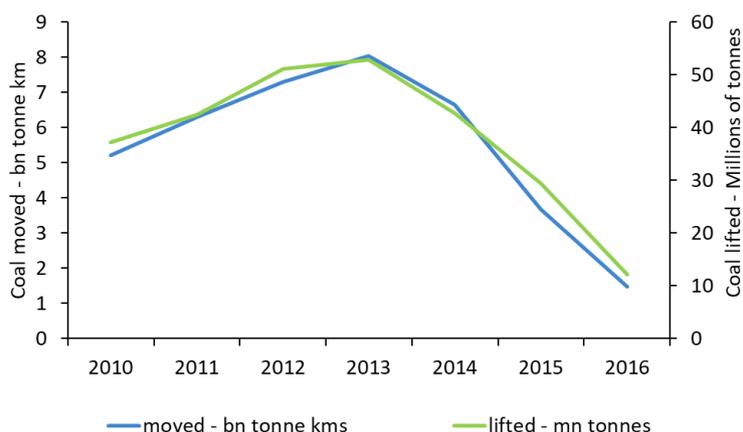
## Demand for rail freight transportation

Lower demand for coal, in general, has had a knock-on impact on demand for rail freight flows of coal, and freight flows have reduced much faster than expected. In 2013, ORR estimated that flows in 2023 would have reduced to 1.6 bn tkm, but this has already been passed (1.5 bn tkm in 2016). This represents an 82% fall between 2013 and 2016.<sup>23</sup>

The 2013 forecasts for coal, carried by rail, used the relevant BEIS (then DECC) forecasts of future use of coal in electricity generation, but noted that much of the industry assumed the Government's forecasts were unlikely to be met.<sup>24</sup> Given that actual usage of coal for generation in the last few years has been in the mid-to-low end of the 2012 forecasts, it is no surprise that rail freight flows of coal have been lower than expected.

The reduction in coal flows in recent years is illustrated in Figure 6.2 below. In 2013, Network Rail estimated that by 2023 coal flows would have fallen to 2.3 billion net tonne km<sup>25</sup> – as the figure shows, coal movements are already below this (1.5bn net tonne km in 2016). Coal lifted, not taking into account distance moved, has moved similarly.

Figure 6.2: Recent historic rail freight coal movements (bn net tonne km and mn tonnes)



Source: ORR data portal

Another important trend in relation to coal freight flows has been its displacement by other 'markets':

- Most significantly, Drax has converted three coal units within its Selby plant from coal to biomass in recent years, so some of this fall in coal freight flows has been replaced by a rise in biomass flows.
- Drax notes that some coal ash is being used within aggregates, e.g. as per the 'aggregates haulage' section on Freightliner's website.<sup>26</sup> Therefore some of the fall in coal is being replaced by a rise in aggregates. For example, in 2015 DB Cargo signed a

<sup>23</sup> ORR data portal

<sup>24</sup> <https://www.networkrail.co.uk/wp-content/uploads/2016/11/Freight-Market-Study.pdf> pp. 36-37

<sup>25</sup> <https://www.networkrail.co.uk/wp-content/uploads/2016/11/Freight-Market-Study.pdf> pages 36-37

<sup>26</sup> <https://www.freightliner.co.uk/bulk-haulage/our-services/aggregates-and-minerals/>

six-year deal to transport 2,400 tonnes per week of ash between West Burton Power Station (Nottinghamshire) and East Peckham (Kent), to be used in the production of concrete blocks. This example supports the argument above that flows of aggregates are being driven by demand in the South East of England. However, this trend was raised by a single stakeholder and so our sense is that it is not an important driver of the reduction in coal flows.

Finally, stakeholders have noted that as coal power stations have closed, there are residual stockpiles of coal located at these plants. There is demand for these stockpiles from the few coal power stations that are still operational (e.g. Drax), and this coal is being transferred both by rail and road. As such, coal transportation is currently not simply comprised of the traditional port-to-plant flow, but also now includes some plant-to-plant movements.

This potentially changes market dynamics, at least at the margin, and is likely to increase the elasticity of coal flows. Firstly, these plant-to-plant movements do not necessarily have direct rail links (i.e. not to the same extent as port-to-plant flows), so road transport is a more viable alternative. Secondly, with coal stockpiles available, power stations (like Drax) still burning coal have an alternative to moving coal from ports by rail.

## 6.2. Analysis

To assess the ability of coal rail freight to bear a charge, we consider in the subsections below competition from other modes, characteristics of the market for coal within UK power generation, and the likely impact of the existing FSC. We also comment on wider government policy objectives and their relevance to this market.

### Competition from other modes

At PR13, ORR concluded that “*the costs of transporting [coal] by road over longer distances are uneconomic*”.<sup>27</sup> Whilst this is likely to remain the case, it can be argued that the market may have become more elastic in recent years because:

- Fuel costs have fallen which has increased the cost competitiveness of road, although this will primarily have impacted shorter distance flows.
- With coal flows falling, the costs of operating and maintaining coal-handling facilities at ports have to be spread over fewer km, so the cost per distance travelled has risen. This, in turn, has increased the cost of rail transport.
- Existing stockpiles have increased plant-to-plant flows, as noted above, some of which shorter and are therefore being undertaken via road (by truck).

On the other hand, coal handling facilities have now closed at a number of ports (Immingham is currently the only UK port that handles coal), so the distance that coal has to travel (whether

---

<sup>27</sup> ORR, *Periodic Review 2013 Rail freight: conclusion on the average variable usage charge and a freight specific charge*, January 2013, p.68.

by road or by rail) is likely to have risen. Given that rail is more cost effective over longer distances, this may have increased the competitiveness of rail for transporting coal, partially offsetting the issues noted above.

Overall, whilst rail transportation of coal may have become more elastic in recent years, the market is likely to remain relatively inelastic over longer flows.

## **The market for coal within the context of UK power generation**

### Introduction

The market for power generation is important because different companies – and specifically, different technologies – compete against each other within the UK's power generation mix. If the FSC affects coal's competitiveness within the power sector (e.g. by reducing demand for coal generation relative to other technologies), this would likely impact on coal rail freight movements. If the FSC causes demand for a particular commodity to fall (e.g. coal), and this causes rail freight flows to fall, this could suggest that the market may not be able to bear a charge.

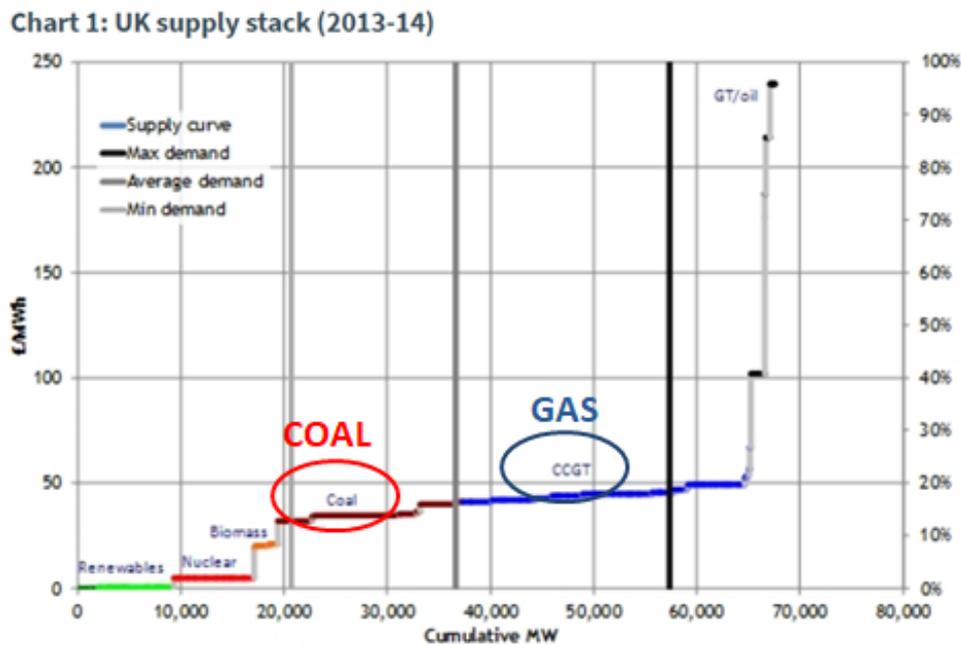
As such, the key issue for 'market can bear' analysis is to understand the extent to which different energy technologies are competing against each other, and whether the FSC would be sufficient to reduce demand for a particular technology.

### The merit order

To consider the relative competitiveness between different energy technologies, we consider the UK's merit order – this is the ranking of electricity technologies by marginal costs, which indicates the order in which technologies are likely to be demanded and dispatched. Below, we consider how the merit order has changed over time – firstly by showing the position in 2013/14, and then discussing the changes that have occurred since then.

In 2013/14, coal was 'within merit' in the UK's merit order, but was at the margin. As shown in the diagram below, it was just 'within merit' at average demand, and just 'out of merit' (and therefore not dispatched) at minimum demand. In addition, gas was only marginally more expensive.

Figure 6.3: UK power generation supply stack, 2013/14



Source: Timera Energy website <sup>28</sup>

However, the merit order has changed since 2013/14, as **coal and gas have now switched positions in the merit order**. Following a fall in gas prices since 2013/14, electricity generation from gas is currently cheaper than electricity from coal.

We were not able to obtain an up-to-date merit order from Ofgem or public sources. So, to show this 'change in positions' between coal and gas in recent years, we use evidence on the *gross profits* (per MWh) made by notional gas and coal generators – these are known as 'spreads'.<sup>29</sup> Although spreads can vary for individual plants (based on their efficiency of fuel usage), calculating the gross profitability for notional plants (using a generic efficiency assumption) allows us to approximately infer the merit order of different technologies.

The spreads for gas and coal plants are shown in the chart below. The profitability of gas plants (known as the 'Spark Spread') is shown using the blue lines, whilst the profitability of coal plants (the 'Dark Spread') is shown using the grey line. The different blue lines are based on different assumptions for gas plant efficiency, which are used to calculate the spark spread. There are three key observations:

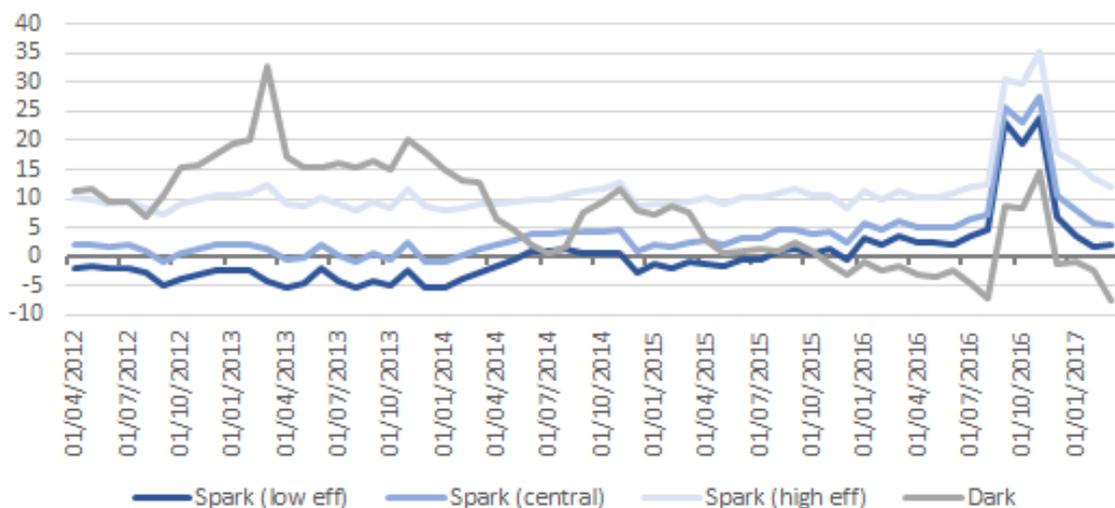
- Focusing on the right-hand side of the graph (data for March 2017), the dark spread is currently negative. This means that coal plants are not profitable *on average* (i.e. based on the average market price for electricity in the month of March 2017). However, we note that coal plants can still be profitable *at specific points in time* (e.g. during peak winter demand), if and when the market price rises sufficiently due to high demand.

<sup>28</sup> <http://www.timera-energy.com/gas-plant-renewable-penetration-a-uk-case-study/>

<sup>29</sup> 'Spread' is gross profit, i.e. revenue minus costs of fuel and any emission permits.

- As of March 2017, the spark spread is positive, and is at least £10/MWh above the dark spread (the differential depends on the gas plant efficiency assumption). This indicates that gas plants are considerably more profitable than coal, and that gas will be dispatched ahead of coal in the merit order.
- The differential in spreads has changed over time. Prior to the end of 2014, the dark spread was above the spark spread, which explains why coal was above gas in the merit order in 2013/14 (shown in Figure 6.3 above). Since the end of 2015, coal plants have been consistently less profitable than gas plants.

Figure 6.4: Historic monthly average 'spreads' for coal and gas generation, £/MWh, 2012 – 2017



Source: Ofgem<sup>30</sup>

### Implications of the merit order for the market's ability to bear the FSC

If the differential in spreads was small (i.e. if the profitability of gas and coal generators were fairly similar), the FSC might have an impact on demand for coal within the overall UK power market. However, the chart above shows that the differential between the 'spreads' is currently fairly large. Further evidence provided to us by Ofgem suggests this difference will continue into at least the near future.<sup>31</sup>

The most important issue is how large the coal FSC is in comparison to the size of this differential in spreads. From some detailed analysis, we estimate the coal FSC to be very small relative to the differential in spreads, which suggests that the FSC is very unlikely to impact coal's position in the merit order. This implies that the coal FSC is unlikely to affect the level of demand for transported coal by power plants, and therefore coal has a continued ability to bear the charge. (Note: Our assumption that the FSC is relatively small is discussed further in the following subsection.)

<sup>30</sup> Ofgem, Data on *Spark and dark spreads (GB)*, accessed August 2017.

<sup>31</sup> Ofgem provided us with data (originally from Bloomberg) that forecasts the difference between the 'spark' and 'dark' spreads to remain at least £5/MWh over the next 12-15 months.

### Implications of low profitability

As noted above, coal plants were *on average* not profitable during March 2017 – although (as discussed) they would have been profitable at specific peak demand times. There is a question of whether an additional charge (the FSC) would affect the ability of the market to bear when the coal market is already experiencing low (and even negative) profitability. This is difficult to say for certain. If the FSC doesn't affect the merit order, coal will still be demanded during peak times – but the electricity market price will need to be slightly higher to cover the cost of the FSC. In this sense, the FSC does not strictly affect the market's ability to bear. Furthermore, as noted above, the FSC is relatively small.

However, while not strictly impacting on the 'ability to bear', there is a wider question around the 'fairness' of imposing an additional charge (i.e. the FSC) on a market that is already in decline. This is noted later in Section 12.

### Limited hours running

We have considered whether limits on running hours for coal plants have had an impact on the market's ability to bear.

Recent EU Emissions Directives have imposed stricter emissions standards on generating plants, and have imposed limited running hour requirements. The Large Combustion Plants (LCP) Directive (2001) required that plants built before 2007 would either need to comply with the specified emissions standards, or close by 2015 with plant running hours limited to 20,000 per year post-2007. This Directive was superseded by the Industrial Emissions Directive from 2016 onwards, which imposed further limitations on coal plants. Specifically, plants could choose to either run for up to 17,500 hours between 2016 and 2023 (under the Limited Life Derogation, or LLD), or close by 2020, or run for up to 1,500 hours per year (under the Transitional National Plan, or NTP).<sup>32 33</sup>

In terms of the impact of these policies on the coal sector (and the market's ability to bear), there was an increase in coal generation in 2012 and 2013, and there is a suggestion that this was in part due to operators using up their remaining limited running hours under the LCP Directive prior to closure.<sup>34</sup> There is a question of: (a) whether this is likely to be the case; and (b) if so, whether this effect could apply in CP6. If 'yes', it could be argued that the existing running hours' limitations (up to 2023) might increase demand for coal and increase the ability for the rail freight market to bear the coal FSC.

In terms of the change in coal generation in 2012 and 2013, we consider that the main factors were coal generators taking advantage of cheaper coal imports from the USA, and seeking to

---

<sup>32</sup> Chris Littlecott, *G7 coal phase out: United Kingdom, A review for Oxfam*, October 2015, p.20

<sup>33</sup> In theory, if plants were able to reduce their emissions, they could be exempt from having to close or from operating under limited running hours. However, no such 'clean' coal plants exist in the UK, and since the UK Government cancelled investment in 2015 to develop carbon capture and storage (CCS) technology, our understanding is that it is very unlikely that there will still be coal plants operating in the UK beyond 2025.

<sup>34</sup> Chris Littlecott, *G7 coal phase out: United Kingdom, A review for Oxfam*, October 2015, p.19

use up their running hours prior to the introduction of the carbon price support in 2013. Therefore, the running hours' limitation is only likely to have been one factor.

Looking forward to CP6, the Chancellor Philip Hammond announced in 2016 that the carbon price would be capped until 2020, so it seems unlikely that the existing limited running hours (under the UK's Transitional National Plan) will result in a rise in coal generation in the near future. As such, it seems unlikely that this issue will have an impact on the market's ability to bear the FSC.

### Caveat

As a caveat, we understand that Government policy and market dynamics have considerably reduced the profitability of coal generation, and stakeholders have raised the fairness of maintaining a charge for a market that is already struggling. Whilst an important point, this is a different question to whether the 'market can bear' a charge. We discuss this issue further in our overall conclusions (Section 12).

### **Impact of FSC**

As noted further above, from an assessment of the FSC in comparison to the total costs of electricity generation from coal, the FSC appears relatively small. Even when the FSC is fully implemented in 2018/19, we estimate that it will have increased the costs of coal-fired electricity generation by less than half a percent. Therefore, we do not expect it to have had a significant impact during CP5.

As noted in Section 2, the FSC is being phased in, and the current 2017/18 charge is still only 60% of what it will be in 2018/19. The charge for last year (2016/17) was even lower, at just 20% of the 2018/19 charge. In terms of timing, the phased implementation of the FSC has occurred *after* the significant reduction in rail freight transport of coal, so it is unlikely to have been a significant driver of change. Rather, EU and UK Government policy and the reduction in gas prices seem likely to have been the main drivers.

One stakeholder suggested that a port decided to close its coal-handling facilities directly as a result of the FSC. It seems unlikely that the FSC alone would have led to the closure decision, as it is a small (but not insignificant) part of total costs. Nonetheless, we accept that the FSC may have been a contributory factor in the decision to close the plant, alongside wider factors (e.g. reduced coal demand).

### **Wider government policy**

As part of the Paris Agreement, the UK has a commitment to significantly reduce carbon emissions. As noted further above, the UK's remaining coal-fired power stations are due to be closed by 2025. Although not a market can bear issue directly, it would appear inconsistent with overall Government policy if the FSC for coal were to be removed, as this would in effect increase the rail subsidy to the coal sector – encouraging coal at a time when other policies

are aimed at discouraging it. This effect would be compounded if the FSC were to be applied to biomass, a renewable source that the government is encouraging, but not coal.

### **6.3. Conclusions**

On balance, there seems to be more evidence in favour of the ESI coal market's ability to bear – or rather, to continue to bear – the FSC, given it is already in place in CP5. Whilst demand for rail by the coal market may be becoming somewhat more elastic over time, it is still likely to be relatively inelastic for longer flows. The difference in costs between coal and gas generation appears fairly large, so the FSC (which is a small proportion of total generation costs) is unlikely to impact coal's position in the UK energy generation merit order.

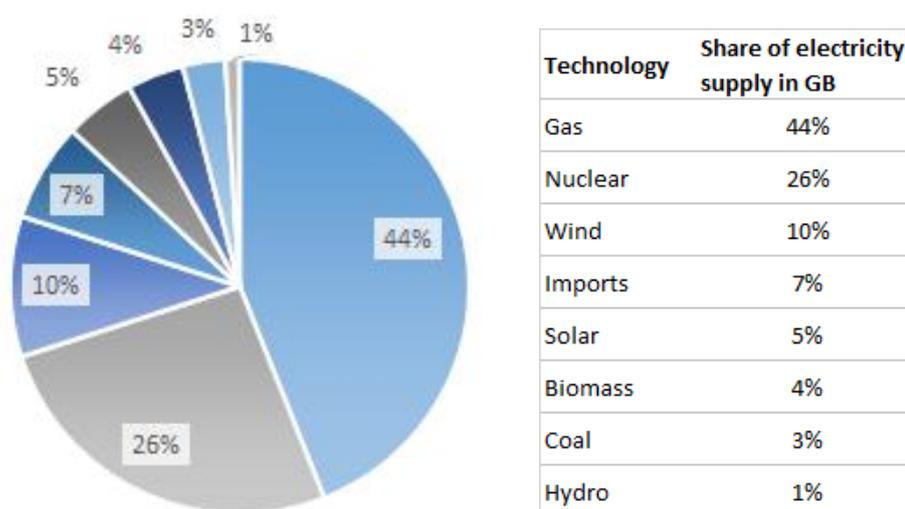
## 7. FSC FOR BIOMASS

### 7.1. Context

#### Demand for biomass by power stations

The volume of UK electricity generated from biomass increased by 62% between 2013 and 2015, or by 127% since 2011.<sup>35</sup> As shown below, biomass' share of generation is now circa 4% (as of Q3 2016); more than coal for the equivalent period.

Figure 7.1: Britain's electricity supply mix in Q3 2016 (% of 66.6 TWh supplied by energy type)



Source: Solar Power Portal website (originally from Drax)

The growth in biomass to date primarily relates to the conversion of two plants from coal to biomass – Drax's Selby plant and the Lynemouth Power Station. These conversions were facilitated by UK Government's provision of renewables subsidies. Both generators receive Contract for Difference (CfD) subsidies, determined under the one-off Final Investment Decision Enabling for Renewables (FIDER) in 2014. Two of Drax's units also receive support via the (now closed) Renewables Obligation (RO) scheme. One other dedicated biomass plant (TeesREP), which is under construction, will receive CfD support.<sup>36</sup> These subsidies are 'locked in' for 15 years<sup>37</sup>, and therefore provide certainty to investors.

The necessity of Government subsidy, for the viability of biomass, was underlined by the withdrawal of several potential investors after it was announced that their proposals would not receive the level of subsidy that they had expected. By way of example, in 2013 the UK developer RES announced that it would not construct a planned £300 million dedicated biomass power station in Northumberland, citing reductions in subsidies available under the RO scheme.

<sup>35</sup> EC March 2017 energy markets datasheets <https://ec.europa.eu/energy/en/data-analysis/country>

<sup>36</sup> We note that there are other users of biomass, e.g. combined heat and power. But these users are smaller and are less relevant to rail transportation. Network Rail forecasts that, up to 2023, 80% of biomass will be moved by rail: <https://www.networkrail.co.uk/wp-content/uploads/2016/11/Freight-Market-Study.pdf> (p.38)

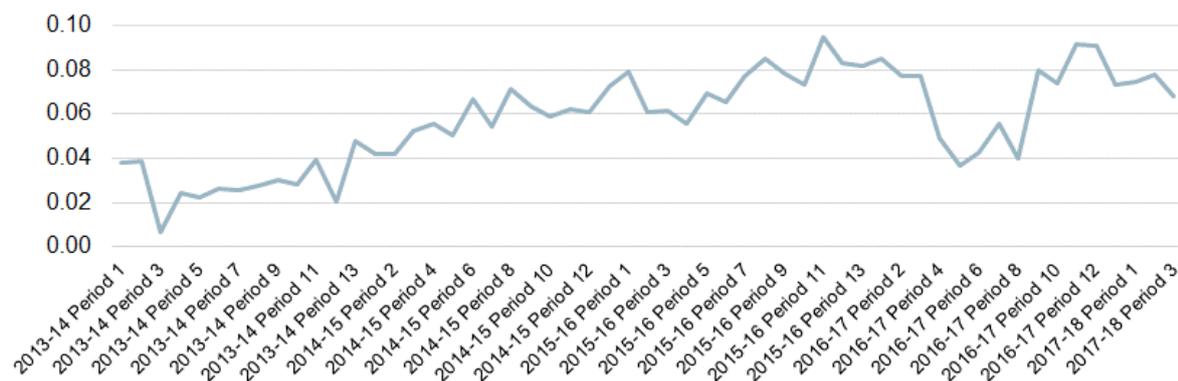
<sup>37</sup> DECC, Investment Contract, Teesside Renewable Energy Project, May 2014

There is, therefore, some uncertainty around the future of this market, at least for potential new investors. For example, in the UK Government’s first CfD auction in 2015, no subsidies were allocated to biomass conversion and in the most recent auction (September 2017) only two small plants (unlikely to be dependent on rail) were awarded subsidy. There is also some political pressure to restrict future biomass subsidies due to concerns about its environmental sustainability (the majority of biomass is imported), which may further limit available subsidies. Therefore, while the UK biomass market has grown substantially in recent years, we consider it is unlikely to continue to do so – it is more likely to increase slowly, or plateau.

### Demand for rail freight transportation

As illustrated below, biomass rail freight flows have increased significantly in recent years, growing by 133% between 2013/14 and 2016/17 – more than any other commodity. However, the chart also provides initial signs that growth may have stalled recently (2017/18). This is consistent with our understanding of the biomass energy market more broadly and as discussed in the previous subsection.

Figure 7.2: Actual biomass rail freight movements (bn net tonne km, per month)



Source: Network Rail

With coal rail flows continuing to decline, Network Rail forecasts that freight movements for biomass could overtake coal in 2017/18, although growth in biomass movements from 2018/19 is forecast by Network Rail to be moderate.

Overall, whilst the biomass market seems to be relatively established for existing participants, the likelihood of potential new investors entering the market in the near future is much less certain. A recent rail freight report suggests that the outlook for the rail freight market with respect to biomass is ‘static’, i.e. neither growth nor decline.<sup>38</sup>

<sup>38</sup> DFT (prepared by Aecom), Future Potential for Modal Shift in the UK Rail Freight Market, 2016, p.7 and 17.

## 7.2. Analysis

To assess the ability of biomass rail freight to bear a charge, in the following sub-sections we consider competition from other modes, the market for biomass within UK power generation, and the likely impact of a FSC. We also consider wider government policy.

### Competition from other modes

There are two biomass plants in the UK that use rail freight services – Drax’s plant in Selby and the Lynemouth Power Station, north of Newcastle.<sup>39</sup> Drax’s plant brings biomass from Liverpool Docks and the Port of Immingham, whilst Lynemouth Power Station transports biomass via rail from the Port of Tyne. These rail flows are short-to-medium in length, at 100 miles, 50 miles and 20 miles respectively. Other, smaller biomass plants will tend to obtain their biomass locally, and therefore will use road transport.<sup>40</sup>

Biomass is less dense than coal<sup>41</sup>, so its transport costs are higher. However, it is still a relatively heavy a commodity and analysis by MDST indicates that rail has a cost advantage for port-to-plant flows such that “*transfer to road would be unlikely*”, even with a biomass FSC.<sup>42</sup>

### Rail-specific investment

There has been considerable rail-specific investment to support both of the two major biomass plants in the UK, i.e. in Selby and in Lynemouth.

- Since Drax’s announcement of its intention to convert three of its coal plants to wood pellets (biomass), Associated British Ports (ABP) has installed a biomass storage facility at the Port of Immingham – the Immingham Renewable Fuels Terminal (IRFT). It is the biggest biomass facility in the world. ABP invested £130m into the storage facility, and created a new rail loadout facility for delivering biomass straight to Drax in North Yorkshire. It uses purpose-made railcars for Drax at a total cost of £3m.<sup>43</sup> In 2015 Liverpool Docks invested £100m in dedicated biomass handling facilities and specially-designed biomass wagons to facilitate flows to Drax.
- To provide biomass to the Lynemouth Power Station, the Port of Tyne has also invested £100m in its facilities. The power station has signed a 10-year deal with GB Railfreight (GBRf) to transport the biomass from the Port of Tyne to the power station, which includes GBRf procuring 50 new purpose-built biomass hopper wagons.

---

<sup>39</sup> Ironbridge power station previously transported biomass via rail from Liverpool Docks, but this plant was decommissioned in 2015.

<sup>40</sup> ORR, Biomass consultation, February 2013, p.7

<sup>41</sup> ORR, Biomass consultation, February 2013, p.9

<sup>42</sup> ORR, Biomass consultation, February 2013, p.8

<sup>43</sup> <https://www.worldcoal.com/special-reports/02052016/port-of-immingham-696/>

This investment (and the long-term contracts associate with it) in rail-specific biomass infrastructure sends a strong signal of the generators' commitment to rail transportation. Therefore, it is likely that demand for rail is highly inelastic for these particular generators, and this is an argument in favour of the market being able to bear a charge.

We note that this investment has occurred *despite* ORR indicating at PR13 it would reconsider at PR18 whether it would be appropriate to apply the FSC to biomass. We consider it likely that ABP factored in the risk of the FSC being levied when making its investment decisions.

### Caveat

Stakeholders have however raised their concern about whether large sunk investment implies that there is an ability to bear a charge. Concerns were raised that levying a charge ex-post of sunk investment would be 'unfair', and could create additional uncertainty which might constrain potential future investment. The issue of 'fairness' is a wider policy concern that goes beyond the scope of an economic 'market can bear' assessment. Nonetheless, this is an important issue which we discuss further in our overall conclusions (Section 12).

### **The market for biomass within the context of UK power generation**

As noted above, considerable rail-specific investment has been undertaken in relation to the biomass (conversion) plants at Selby and Lynemouth. Not only does this reveal investors' confidence in rail as the mode of choice for biomass, but it reveals the investors' beliefs that *biomass generation* will be sufficiently profitable over the medium term to make a return on their investment. This implies a degree of inelasticity in relation to the market, at least for existing market participants who have undertaken investment.

There are other (more marginal) reasons to consider that existing players in the biomass market may not be materially affected by levying a FSC:

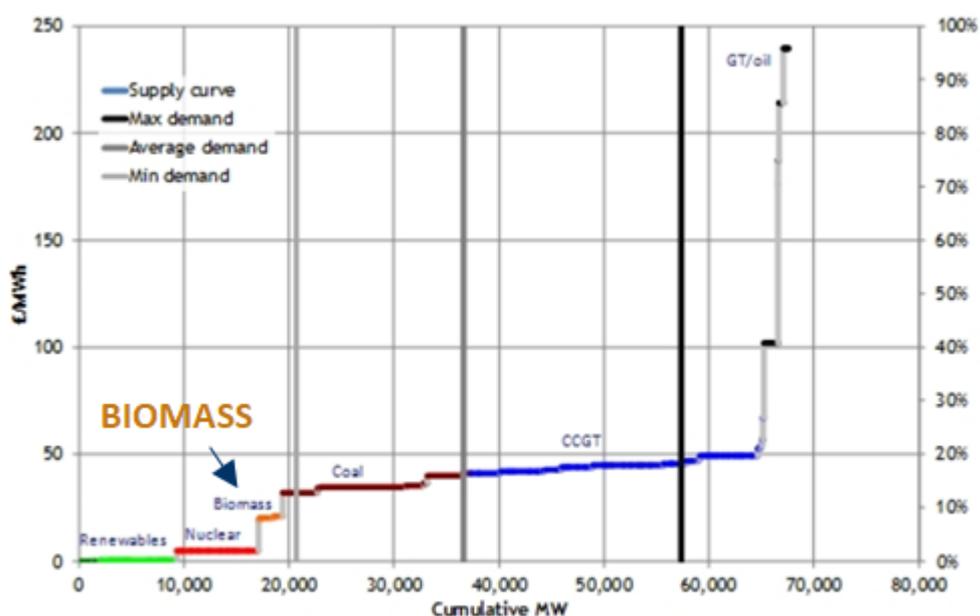
- Industry commentators have suggested that renewables subsidies – and in particular the biomass CfD subsidies allocated under the FIDER mechanism in 2014 – may be 'generous'.<sup>44 45</sup> However, it is not possible for us to corroborate these suggestions as that would require access to confidential plant cost data.
- Biomass is a relatively high cost technology however, once subsidies have been taken into account (as in the figure below) it is competitive – and therefore is often dispatched even at minimum demand. We also note that this chart is from 2013/14, so relative costs may have changed since then, e.g. as discussed earlier, gas costs have fallen.

---

<sup>44</sup> <https://www.ft.com/content/a85bf394-fd31-11e3-8ca9-00144feab7de>

<sup>45</sup> <http://www.independent.co.uk/environment/government-blamed-for-generous-green-energy-subsidies-which-leave-consumers-footing-the-bill-9566350.html>

Figure 7.3: UK power generation supply stack, 2013/14



Source: Timera Energy website <sup>46</sup>

- Drax has recently (December 2016) indicated that it is interested in converting a fourth unit to biomass, and is seeking financial support for this.<sup>47</sup>

Overall, there seems to be some evidence to suggest that existing market participants would have the ability to bear a FSC.

### Wider government policy

Although not directly relevant to a market can bear assessment we note that biomass is considered a form of renewable energy, it would therefore be inconsistent with UK Government environmental policy if the FSC for biomass were to be greater than that for coal. Although, as noted earlier, there are some environmental concerns around large-scale biomass generation because the majority of biomass is imported and may not be fully carbon-neutral. Therefore, we recommend that the level of the coal FSC is taken into account when making a decision around a FSC for biomass.

### 7.3. Conclusions

There are some good arguments in favour of the (current) market's ability to bear, particularly the inelasticity of demand for rail from the Drax and Lynemouth plants (given considerable sunk investment), and the likely profitability of biomass generation for these plants (in light of Government subsidies).

<sup>46</sup> <http://www.timera-energy.com/gas-plant-renewable-penetration-a-uk-case-study/>

<sup>47</sup> <https://www.theguardian.com/environment/2016/dec/19/power-station-shares-jump-ec-approves-wood-burning-subsidies-coal-switch>

However, the apparent lack of subsidy available to additional biomass generation appears to have deterred further recent investment, and the considerable growth in biomass in the last five years seems likely to level off if the Government maintains its current policy of not offering new subsidies for biomass conversion. The availability and the amount of subsidy is of far greater significance (in terms of magnitude) than a potential biomass FSC. Therefore, it does not seem likely that levying a FSC for PR18 would have a considerable impact on investors' decisions.

Despite several arguments that lean towards the conclusion that the biomass rail freight market *is* able to bear, we note that it is difficult to draw strong conclusions because we do not know the precise operating costs of the Drax and Lynemouth plants, and therefore cannot say definitively how their business might be impacted by a charge. However, as noted above, the considerable investment in rail infrastructure suggests that the level of commitment to rail freight by these plants is high, and therefore on balance we consider (albeit with some caution) that the market is likely to be able to bear a FSC.

## 8. FSC FOR IRON ORE

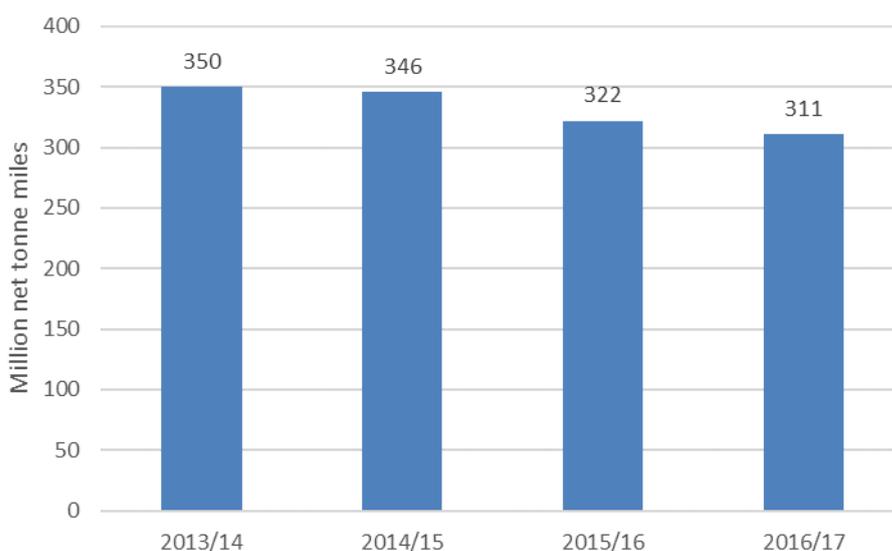
### 8.1. Context

Iron ore is one of the raw materials used in the production of steel, along with coal, coke and lime. The transportation of iron ore from the Port of Immingham to the steel works at Scunthorpe is the main flow of iron ore by rail freight. Since 2016, the plant has been owned by British Steel – before then it was owned by Tata Steel. Freightliner took over the contract for the Immingham-to-Scunthorpe route from DB Cargo in 2016.

Whilst this was the single flow of UK rail freight transport for iron ore at PR13, British Steel does now also transport some iron ore from Redcar (following the steel plant's closure in 2016), although this is a much smaller flow. The only other UK plant requiring iron ore is the steel works at Port Talbot, which can receive the iron ore directly by ship due to its coastal location.

Overall, the flow of iron ore via rail has fallen by 11% during PR13 to date (2014/15 to 2016/17, see Figure 8.1 below). From discussions with British Steel, this is primarily due to the closure of two steel mills in the UK, and as steel production has fallen, so has demand for iron ore.

Figure 8.1: Historic iron ore rail freight flows



Source: Network Rail

The Scunthorpe plants produces steel for rail (i.e. tracks), construction (e.g. joists), rods and coils (e.g. for reinforced concrete), and 'yellow goods' (e.g. for JCBs). The majority of British Steel's steel is sold domestically, and rail is its largest sector. From discussions with British Steel, its single largest domestic customer is Network Rail (in terms of sales), although it has not been possible to understand the precise proportion. Similarly, Network Rail purchases the vast majority of its steel from British Steel – in 2016 Network Rail purchased 120,000 tonnes

of steel rail from the Scunthorpe plant versus 8,000 tonnes of steel from overseas (Spain and Austria).<sup>48</sup>

Of British Steel's exports, the majority goes to their mill in France, where the steel is then rolled and sold to SNSF primarily (the French rail network operator).

In terms of market trends, the most important trend for this commodity is that UK steel production overall has been suffering from low profitability in recent years. The main drivers of this are a fall in the global steel price, due to an increase in low-cost steel production, particularly in China (so steel imports to the UK from China have displaced UK production<sup>49</sup>), increased raw material costs (e.g. the cost of iron ore has risen significantly), and increased energy costs involved in steel production (e.g. due to environmental policies).<sup>50</sup> We also understand that British Steel experiences relatively strong competition from European steel producers.

## 8.2. Analysis

To assess the ability of iron ore rail freight to bear a charge, in the following sub-sections we consider competition from other modes, characteristics of the end-customer (demand side market dynamics), and the potential existence of further market segments (e.g. based on geographic characteristics) with different ability to bear. We also consider wider government policy.

### Competition from other modes

Competition from other modes is low for the Immingham to Scunthorpe flow. As noted earlier, MDST found that road transport for iron ore would be around three times the cost of rail transport, so road is not a realistic substitute. From discussions with British Steel, they estimate the cost of rail transportation is half the cost of road.

British Steel noted that a potential threat to this cost differential is if ABP continues to increase port handling charges – which we understand have risen significantly in recent years. However, some of these port handling charges may also apply to road transportation.

The cost competitiveness of rail is reflected in the existing long term contracts for iron ore handling and rail transportation – in 2013 Tata Steel signed a 15-year deal to continue using specialist coal and iron ore unloading facilities at the Bulk Terminal at Immingham, where the iron ore is loaded onto dedicated trains before being transported to Scunthorpe.<sup>51</sup>

British Steel has noted that flexibility of road is slightly greater – it can place orders at very short notice. It states that some of its iron ore is delivered from Redcar is by road, although it

---

<sup>48</sup> <http://www.mirror.co.uk/news/uk-news/network-rail-spend-5million-foreign-7689532>

<sup>49</sup> From discussions with British Steel, rail flows of steel are much lower than flows of iron ore, and steel can be transported via road or rail.

<sup>50</sup> <http://www.bbc.co.uk/news/business-34581945>

<sup>51</sup> <http://www.abports.co.uk/newsarticle/55/>

also receives some by rail. On the other hand, there is much greater organisational complexity involved in coordinating significant fleets of trucks to deliver iron ore to the Scunthorpe Site, given the high levels of traffic created by this. British Steel has been public in its desire to keep iron ore flows on rail. The existing facilities at the Scunthorpe plant (e.g. a machine that can pick up rail wagons and tip out the iron ore) make rail an efficient solution.

Overall, British Steel has considered the possibility of road transport in relation to rail (e.g. by considering the relative costs and other issues), so it is not the case that rail will always remain the *only* viable mode of transport. However, as the relative costs stand to date, road does not appear to be an attractive alternative to rail for the main iron ore flows from Immingham.

### **Demand-side market dynamics (the end customer)**

The FSC is likely to be passed on (at least in part) to the end customer, so it is important to consider how customers have reacted to date, and how they are likely to react in the future. Whilst the FSC is already applied to iron ore, it has so far only partially been phased in, so considering the end customer requires some forecasting – rather than simply observing how customers have responded to date.

Network Rail is the plant's major domestic customer and, as noted above, buys the vast majority of its steel from British Steel, with the remainder from Europe. We understand that it does not buy any of its steel from China. In 2016, the UK Government announced that it would require public sector buyers to consider social and economic benefits, alongside value for money, when procuring steel for capital projects, with the aim of putting UK-produced steel on a 'level playing field' with cheaper imports.<sup>52</sup> Therefore, we consider it likely that Network Rail will continue to purchase from British Steel, even once the FSC is fully-phased in.

In terms of the potential impact of the FSC on British Steel's other customers:

- British Steel has a number of international contracts, e.g. particularly with the French rail operator SNCF, but also with the Finnish Transport Agency, etc.<sup>53</sup> These customers may be more sensitive to rising costs, particularly post-Brexit.
- The construction of HS2 (High Speed Rail 2) in the UK presents a significant opportunity for British Steel, as the project will require millions of tonnes of steel rail. Government 'sources' have suggested it is very likely that British Steel will be a major supplier,<sup>54</sup> although more recently the Government has stopped short of fully committing to using British Steel for HS2. If Chinese investors are involved in the financing of HS2, there could be some political pressure to use Chinese steel for construction, at least in part.

---

<sup>52</sup> <http://www.express.co.uk/news/uk/657721/Government-lifeline-for-Tata-Port-Talbot-HS2-built-with-British-steel>

<sup>53</sup> <http://britishsteel.co.uk/news-events/british-steel-marks-rail-anniversary-with-european-contract-win/>

<sup>54</sup> Ibid.

Overall, we are told that there is a strong desire from Network Rail to continue purchasing from British Steel, and HS2 does present a significant further opportunity to increase market share.

## Impact of FSC

### Impact during CP5 to date

The UK steel industry has experienced falling profitability in the last decade. Most recently the Scunthorpe plant was still making a loss in 2016, at which point Tata Steel sold the plant to British Steel. Having considered whether the FSC has played a role in this low profitability for the UK steel sector – and in particular for the Scunthorpe plant – we consider that losses at the Scunthorpe plant were almost certainly not the fault of the iron ore FSC:

- The iron ore FSC only came into effect in 2016/17, and even then, only partially, due to its phased implementation. Tata Steel was making losses in the run-up to 2016, which pre-dates the FSC.
- As identified by ORR during the PR13 decision, the FSC for iron ore only causes a very marginal increase in the overall cost of steel production, so it is not likely to have a significant impact on the cost of steel. British Steel has confirmed that the iron ore FSC only contributes a marginal increase for the Immingham-to-Scunthorpe flow (although the impact is slightly greater for any flows from Redcar).
- Since 2016 Tata Steel has been looking to sell all of its UK operations (i.e. not just the Scunthorpe plant), and has recently sold several of its Yorkshire steel mills.<sup>55</sup> Given that the iron ore FSC is specific to the Scunthorpe plant, this supports the argument that it is broader issues – rather than the FSC – that are behind low profitability at the Scunthorpe Plant.
- This argument is further supported by British Steel's recent announcement (June 2017) that it has achieved a £47m profit in its first year of operations since it purchased the plant from Tata Steel.<sup>56</sup> This is despite the FSC not actually being implemented (phased in) before British Steel purchased the plant.

### Dynamic between the FSC and Network Rail

If the FSC is levied and the cost is passed onto Network Rail in full, in theory Network Rail would be financially-neutral from this: on one hand, it will receive greater income from the FOC paying the FSC, whilst on the other hand it will pay more for the steel once the FSC is passed through.

However, from discussions with British Rail, we understand that Network Rail's 'buying' department operates distinctly from other divisions within Network Rail, so it would not

---

<sup>55</sup> <http://www.telegraph.co.uk/business/2017/02/09/tata-agrees-sell-uk-steel-business-liberty-100m/>

<sup>56</sup> <http://www.telegraph.co.uk/business/2017/06/01/british-steel-hails-turnaround-loss-making-scunthorpe-plant/>

consider a cost pass-through to be ‘financially-neutral’. As such, British Steel states that it would not be able use such an argument to pass-through the FSC to Network Rail via higher prices. As such, the FSC may impact on demand for steel from Network Rail, albeit a relatively small impact given the size of the FSC (as noted earlier).

### **Wider Government policy**

As noted above, the UK Government has recently encouraged public sector organisations to purchase UK-produced steel. The iron ore FSC increases the costs faced by British Steel, and therefore could be seen to be inconsistent with the Government’s wider policy. However, British Steel should be able to pass the charge on in full for steel rail supplied to Network Rail (given it would be financially-neutral, as noted above), so at least British Steel should not be impacted in terms of its sales to Network Rail.

The increase in price is also small in relation to production costs, and opportunities to transport steel in other ways are limited.

### **8.3. Conclusions**

There are a number of reasons why a FSC for iron ore is likely to remain appropriate – competition from other modes is currently very low for the main route (Immingham to Scunthorpe), Network Rail has been encouraged by the UK Government to continue buying steel from British Steel, and the impact of the FSC is likely to be marginal in relation to the overall production costs of steel. There is also the upcoming significant opportunity presented by HS2. We do note that the UK steel industry has experienced lower profitability in recent years, but it is unlikely that the iron ore FSC has played anything more than a marginal role in this.

## 9. FSC FOR INTERMODAL

### 9.1. Context

Intermodal flows have grown in recent years – by 8% between 2013 and 2016, up to 6.7bn ntkm in 2016. However, growth has not been as significant as expected. In 2013, intermodal freight flows were expected to grow to 18bn ntkm by 2023 due to an increase in rail-connected warehousing sites being built.<sup>57</sup> However, given the modest growth between 2013 and 2016, Network Rail now expects such levels (by 2023) to be “*challenging to meet*”.<sup>58</sup>

From stakeholder discussions, our understanding of the intermodal rail freight market is that:

- The main flows are the transportation of containers collected from shippers at deep sea ports to inland locations. Rail competes with road and feeder ships.<sup>59</sup>
- There are also some domestic ‘warehouse-to-warehouse’ flows. Rail only has a very small mode share – the vast majority is road.

The UK Government (the Department for Transport) provides financial support to companies to offset some of the cost premium associated with choosing rail (or inland water) freight transport over road. This is known as the Mode Shift Revenue Support (MSRS) Scheme, which has been in place since 2010, and will continue until at least 2020.

### 9.2. Analysis

To assess the ability of intermodal rail freight to bear a charge, in the following sub-sections we consider competition from other modes, characteristics of the end-customer (demand side market dynamics), and the potential existence of further market segments (e.g. based on geographic characteristics) with different ability to bear. We also consider wider government policy.

#### Competition from other modes

Rail appears to face competition from other modes, particularly on the shortest journeys, where road is a lower cost option in comparison to rail due to having lower fixed costs.<sup>60</sup> This is supported by MDST’s analysis at PR13, which found that intermodal rail freight had a high propensity to switch from rail to road under a change in rail charges.<sup>61</sup> Fuel costs have also fallen recently which is likely to have further increased road’s competitiveness.

---

<sup>57</sup> Network Rail Long Term Planning Process: Freight Market Study, October 2013, p.26-33.

<sup>58</sup> Network Rail Freight Network Study, April 2017, p.25.

<sup>59</sup> Feeder ships are smaller than the (larger) container ships. Some ports are not deep enough to facilitate access by the larger container ships, and therefore feeder ships are used to transport the containers.

<sup>60</sup> Rail incurs freight terminal costs. Over longer distances, these costs can be spread across more km.

<sup>61</sup> MDST, Impact of changes in track access charges on rail freight traffic: Stage 1 Report, Feb 2012, p.2.

Rail is however more cost effective over longer journeys,<sup>62</sup> and is subsidised by DFT's MSRS scheme. For example, from the major ports of Southampton and Felixstowe, rail has an intermodal mode share of roughly one third<sup>63</sup>, with the majority of the remainder transported by road.

Over very long distances (e.g. South England to Scotland), we are told by stakeholders that there is now some mode competition from feeder ships, either directly from the UK deep sea port (e.g. Southampton) or from Europe, e.g. a deep-sea ship stops in Antwerp, where a feeder ship then transports the containers directly from there to Northern England.

Overall, competition faced by rail is relatively high, due to road and potentially ship, which implies that at the very least some (see below) rail traffic has a low ability to bear a charge.

### Further market segments

In December 2015, ORR published a decision to accept commitments offered by Freightliner Limited and Freightliner Group Limited ('commitments decision')<sup>64</sup>. In this decision ORR said that, *"ORR is of the preliminary view that Freightliner holds a dominant position in (i) markets for the provision of DSC rail transport services between each of the Southern Ports and inland terminals in the North West; and (ii) markets for DSC rail transport services between each of the Southern Ports and inland terminals in Yorkshire. It is ORR's preliminary view that as DSC road transport services are included in the markets between the Southern Ports and inland terminals in the Midlands, Freightliner does not currently hold a dominant position in those markets..."*

In other words, ORR reached a "preliminary view" that some parts (traffic between Southern Ports and inland destinations in Yorkshire and the North West) of the intermodal rail market were sufficiently price-insensitive so as to be captive to rail in competition law terms. In such circumstances, it may be possible to identify further market segments based on geographic characteristics that could bear a charge.

ORR asked us to undertake a high-level review of arguments for and against defining such further market segments for intermodal services, in light of its findings. ORR has highlighted that our analysis was undertaken in a different context than a competition investigation; the considerations around defining further market segments for the purpose of charging being different from those in a competition case.

Notwithstanding a potential ability to bear, there are a number of issues which mean that levying a charge on further intermodal market segments could be either unrealistic or infeasible:

---

<sup>62</sup> Road incurs more fuel costs, so the variable cost per km of road freight transport is higher than for rail.

<sup>63</sup> In MDST's view rail's share has historically been constrained somewhat by network and terminal capacity constraints at Felixstowe and Southampton respectively.

<sup>64</sup> See [http://orr.gov.uk/data/assets/pdf\\_file/0011/20351/orr-commitments-decision-2015-12-18.pdf](http://orr.gov.uk/data/assets/pdf_file/0011/20351/orr-commitments-decision-2015-12-18.pdf).

- We have not reviewed MDST’s full analysis or the wider range of evidence relied on by ORR in support of its commitments decision.
- Much of the evidence gathering and analysis underpinning ORR’s commitments decision took place during 2014. It is possible therefore that some aspects of its preliminary views may have been superseded by subsequent events such as the sustained fall in oil prices.
- Applying the FSC must be consistent with the existing legal framework and also with ORR’s statutory duties, e.g. at PR13, ORR concluded that consistency with the existing legal framework would require the FSC to meet several criteria, including efficiency, transparency and being non-discriminatory etc. Within ‘non-discriminatory’, ORR stated that it would need to adopt “*a consistent approach across market segments*”.<sup>65</sup> Given that segments are currently defined by commodity, strong rationale would be required to justify splitting the intermodal into further market segments, i.e. the threshold for supporting evidence would be high and is not met by the high-level analysis that we have undertaken.
- Discussions that we held with ORR and industry stakeholders suggested there are a range of difficult aspects to a full analysis. For example:
  - Charges established as part of the PR18 settlement will remain in place until 2024, by which time the market may have been substantially impacted by factors including:
    - New and recent port investment at Liverpool II<sup>66</sup> and London Gateway<sup>67</sup>; and
    - An ongoing trend towards consolidation and alliances within the global shipping industry which may, other things being equal, tend to increase the countervailing buyer power enjoyed by intermodal rail customers<sup>68</sup>.
  - Intermodal rail services are often provided on a ‘portfolio’ basis, i.e. deep-sea shippers will contract with a FOC across various routes, although we understand that negotiations over price may take place at both an overall contract and route-specific level. Therefore, were the FSC to be applied to an ‘inelastic’ route, this charge could impact the ‘portfolio price’ offered by FOCs to shippers, and as such be potentially spread across both ‘inelastic’ and ‘elastic’ routes.

---

<sup>65</sup> ORR, *Periodic Review 2013 Rail freight: conclusion on the average variable usage charge and a freight specific charge*, January 2013, p.61

<sup>66</sup> E.g. see <https://www.peelports.com/campaigns/liverpool2>.

<sup>67</sup> E.g. see <http://www.londongateway.com/news-media/news>.

<sup>68</sup> E.g. see <http://www.porteconomics.eu/2017/04/20/the-puzzle-of-shipping-alliances-in-july-2016/>.

- Trains carrying intermodal freight are sometimes split, e.g. at Crewe or Daventry, freight trains from the South of England are split between trains travelling to North-West England and trains travelling to Scotland. This adds a practical complexity to levying charges on specific routes.

### **Wider Government policy**

Although, more of a consistency issue than a market can bear issue directly, we note earlier in this report that DFT currently provides subsidies to intermodal rail flows via the MSRS scheme. Applying a FSC to intermodal rail freight would impact the scheme, and could be in conflict with existing Government policy.

### **9.3. Conclusions**

There is some available evidence to suggest that within intermodal there may be further market segments (e.g. based on geographic characteristics), but further investigation and analysis would be required to establish the extent of this, and whether there is a case to consider levying a charge on parts of this market. Were this evidence to become available, ORR might wish to consider its statutory duties, in particular its current view that non-discrimination implies a consistent treatment of whole markets.

## 10. FSC FOR AGGREGATES

### 10.1. Context

- Aggregates are a mix of construction materials and the main customers for them are construction companies. Rail generally provides transportation from quarry to distribution centre, from which aggregates are then distributed locally via road.
- The transportation options available to construction companies are slightly different for aggregates, when compared to intermodal containers for example. For intermodal, the decision is how to get the container from 'A' to 'B' in the most cost-effective manner. For aggregates, different quarries provide competition, so the construction company can choose between 'A1', 'A2' or 'A3'. Sometimes the decision might be between transporting from a larger quarry over a longer distance (e.g. via rail) or transporting from a smaller local quarry over a shorter distance (e.g. via road). This assumes there is spare capacity in local quarries.
- The Rail Freight Group – consistent with MDST's analysis for PR13 – has highlighted that transport costs are a high proportion of delivered cost. As such, mode choice is price sensitive (demand is relatively elastic) and any increase in charges will "*significantly affect how they are delivered*".<sup>69</sup> In addition, this means that aggregates are traditionally sourced as locally as possible, with long distance flows representing a relatively small proportion of the market.
- Rail flows of aggregates increased noticeably (by 22%) between 2013 and 2016. There is evidence that high demand from the South-East construction sector, and a lack of availability locally, has led the growth now being seen in this market segment,<sup>70</sup> i.e. there is excess demand in the South East. However, further investigation would be required to understand how far aggregates are being transported, and whether existing trends are likely to continue.

### 10.2. Analysis

To assess the ability of rail transportation of aggregates to bear a charge, in the following subsections we consider competition from other modes and the demand-side market dynamics for aggregate transportation.

#### Competition from other modes

Aggregates are often transported by road for at least part of the distance, which would therefore make it relatively easy (at least relative to other commodities) to switch from a 'part

---

<sup>69</sup> MDST, *Impact of changes in track access charges on rail freight traffic*, Feb 2012, p.23

<sup>70</sup> <http://www.railtechnologymagazine.com/Rail-freight/Page-42/vtg-rail-and-mendip-rail-sign-130-freight-aggregate-wagons-deal>

road, part rail' flow to a 'fully road' flow, although there could be a volume issue. As such, rail freight flows of aggregates are thought to be fairly vulnerable to road transfer.

As noted above, transport costs are large in relation to the value of the commodity being transported, i.e. the market is relatively elastic. This increases the sensitivity of rail freight transport to a charge. In addition, the reduction in fuel costs in recent years has increased road's competitiveness relative to rail.

One stakeholder noted that, over longer distances (e.g. Scotland to the South East), shipping of aggregates is starting to provide further competition to rail.

### **Demand-side market dynamics**

Construction is relatively pro-cyclical in relation to macroeconomic growth, so there is a question of whether flows will continue to grow, for instance if Brexit were to dampen future growth. Stakeholders also noted that construction is dependent upon Government policy (e.g. new build initiatives), which is relatively uncertain. This uncertainty increases the risk of imposing an additional charge.

### **10.3. Conclusions**

The sensitivity of aggregates flows with respect to a number of factors (price, macroeconomic conditions, and government policy), along with road being relatively cost effective, suggests that demand for rail freight transportation is relatively elastic, and therefore a low ability to bear any additional charge.

## 11. FSC FOR NUCLEAR WASTE

### 11.1. Context

Direct Rail Services (DRS), owned by the Nuclear Decommissioning Agency (NDA), is the only rail operator authorised to transport the UK's nuclear waste. There is already a FSC for nuclear waste. The main issue is that this is essentially a transfer between Government entities. The FSC is borne by DRS, and therefore ultimately NDA – a non-departmental public body. If the charge were to be removed, this would reduce the funding received by Network Rail.

### 11.2. Analysis

For nuclear waste, the key issue is the necessity for transportation by rail, due to safety concerns of transporting waste via road. MDST's 2012 analysis found that "*road would in theory be a possible alternative to rail but public opposition and security issues, etc. would make road unattractive*".<sup>71</sup> MDST's elasticity analysis attributed an elasticity of zero, i.e. perfectly inelastic.<sup>72</sup> At PR13, ORR concluded that spent nuclear fuel does not have any realistic alternative mode of transport.<sup>73</sup>

There is opposition to rail transportation on the grounds that nuclear waste is being transported through towns, sometimes in proximity to passenger trains.<sup>74</sup> However, proximity would be a greater issue with road transportation. And in response to a recent (2016) incidence of opposition to rail transportation, the NDA highlighted that "*the safety record of moving spent fuel by rail is exemplary*".<sup>75</sup>

In terms of the future market for rail freight transportation, on one hand new plants produce less waste than old plants, which would slightly reduce demand for rail freight. On the other hand, nuclear generation is favourable with current UK policymakers (due to its provision of baseload, to offset the reduction of coal generation and the intermittency of renewables) so more plants may be approved in the future, e.g. construction is already underway on the Hinkley Point C nuclear plant in Somerset. However, both of these issues relate to the long term and are therefore, not hugely relevant for CP6.

### 11.3. Conclusions

Overall, the safety-critical nature of nuclear waste means that transportation via any mode other than rail is extremely unlikely in the near future. Given that the FSC is effectively a governmental transfer between NDA and Network Rail, its impact appears marginal.

---

<sup>71</sup> MDST, *Impact of changes in track access charges on rail freight traffic*, Feb 2012, p.20

<sup>72</sup> Ibid, p.10

<sup>73</sup> ORR, *Periodic Review 2013 Rail freight: conclusion on the average variable usage charge and a freight specific charge*, January 2013, p.69

<sup>74</sup> <http://www.dailypost.co.uk/news/north-wales-news/campaign-against-anglesey-nuclear-train-11652484>

<sup>75</sup> Ibid.

## 12. SUMMARY

In this section, we summarise our views on the ability of each market segment to bear the FSC. Following this, we set out some wider considerations that ORR may wish to take into account when setting the FSC.

### 12.1. Recommendations

**Coal.** On balance, there seems to be more evidence in favour of the market's ability to bear – or rather, to continue to bear given it is already in place in PR13 – the FSC. Whilst demand for rail by the coal market may be becoming slightly more elastic over time (at the margin), it is still likely to be relatively inelastic for longer flows. The difference in costs between coal and gas generation appears fairly large, so the FSC (which is a small proportion of total generation costs) is unlikely to impact coal's position in the UK energy generation merit order. Finally, removing the FSC for coal would be inconsistent with the Government environmental policy to phase out coal in the near future.

**Biomass.** There are some good arguments in favour of the (current) market's ability to bear the FSC, particularly the inelasticity of demand for rail from the Drax and Lynemouth plants (given considerable sunk investment), and the likely profitability of biomass generation for these plants (in light of Government subsidies). For potential future investors, the availability of subsidies appears to be of far greater significance (in terms of magnitude) than a potential biomass FSC. Whilst it is difficult to be wholly definitive, because we do not know the precise operation costs of the Drax and Lynemouth plants, the considerable sunk investment in rail infrastructure undertaken suggests that the level of commitment to rail freight by these plants is high and therefore on balance, we consider (albeit with some caution) that the market is likely to be able to bear a FSC.

**Iron ore.** There are a number of reasons why a FSC for iron ore is likely to still be appropriate – competition from other modes is currently very low for the main flow of iron ore (Immingham to Scunthorpe), Network Rail has been encouraged by the UK Government to continue buying steel from British Steel, and the impact of the FSC is likely to be marginal in relation to the overall production costs of steel. There is also the upcoming significant opportunity presented by HS2. We do note that the UK steel industry has experienced lower profitability in recent years, but it is unlikely that the iron ore FSC has played anything more than a very marginal role in this.

**Intermodal.** Although there is some evidence that certain intermodal flows could bear a charge, ORR would need strong evidence of further market segments (e.g. based on geographic characteristics) if it wanted to justify applying the FSC to parts of the intermodal market within the context of its non-discriminatory policy. Whilst there is some evidence available, this is relatively limited in comparison to the threshold that would be required in order to justify a FSC. Much further investigation and analysis would be required to overcome

this hurdle. In addition, a FSC for intermodal rail freight would be inconsistent with the Government's existing MSRS scheme, which subsidises intermodal rail freight costs.

**Aggregates.** The sensitivity of aggregates flows with respect to a number of factors (price, macroeconomic conditions, and government policy), along with road being relatively cost effective, suggests that demand for rail freight transportation is relatively elastic, and therefore a low ability to bear any additional charge. Further investigation in this sector would involve engaging with Network Rail to understand rail flows of aggregates.

**Nuclear.** The safety-critical nature of nuclear waste means that the transportation via any mode other than rail is extremely unlikely in the near future. Given that the FSC is effectively a governmental transfer between NDA and Network Rail, its impact appears marginal.

## 12.2. Wider considerations

From stakeholder engagement, there is a concern that the 'market to bear' test does not take into account all the relevant factors that ORR should consider when reaching a decision around whether or not to levy a FSC. We set out these concerns below, and recommend that ORR takes them into account as 'broader contextual issues' when evaluating the FSC.

**'Penalising' investment.** Some stakeholders raised a concern that the market can bear test could be interpreted as penalising investment: where investment has been undertaken in rail-specific infrastructure this will reduce the likelihood of switching transportation away from rail, making the market more able to bear a charge. This has two potentially negative implications: firstly, that it might be perceived as 'unfair' to investors and could harm industry relationships; and secondly that this could dis-incentivise future investment in the sector. These issues sit outside of the parameters of the 'market can bear' test, although they are still relevant to consider when setting policy.

**Consistency.** Related to the point above, investors have requested that there be greater long-term certainty in terms of setting the FSC. ORR reviews the FSC at each price control review for the subsequent five-year period, but stakeholders typically make investments based on longer time horizons. Although it is not realistic for stakeholders to expect long term policy to retain full consistency with current policy, this does provide an argument in favour of maintaining as much consistency as possible between the FSC in PR13 and PR18.

**Increasing costs for struggling industries.** It is possible that a rail freight market could have an ability to bear a charge even though the underlying commodity that it is serving is experiencing low profitability. Iron ore falls into this category – although the UK steel industry has experienced relatively low profitability in recent years, the FSC appears sufficiently small so as to have limited impact. However, there is a question around whether it is prudent to levy additional costs on industries that are struggling, although again this sits outside of the parameters of a 'market can bear' test.