

Entry and expansion

1. This appendix sets out evidence on:
 - (a) the availability of alternative sources of packaged chlorine (either currently existing or that might be provided by a new entrant);
 - (b) barriers to entry into the distribution of packaged chlorine (other than sourcing packaged chlorine) as well as the costs and time that entry would require; and
 - (c) the barriers to, costs of and time for expansion by existing distributors of packaged chlorine active in the UK.

2. We use the following distinction between entry and expansion: entry is by companies active in other product markets or suppliers based in Continental Europe; expansion refers to an existing business already active in the distribution (or packaging) of packaged chlorine in the UK.

Alternative potential sources of packaged chlorine

3. Apart from BOC/ITarget Business, there will be three other potential sources of packaged chlorine post-merger: (a) Albion, the only other UK packager; (b) new entrants into the packaging business in the UK; and (c) importers of packaged chlorine from Continental Europe. On the basis of the evidence discussed in Appendix F, we considered imports of packaged chlorine from Europe to be uneconomic at current selling prices. In this section we focus on Albion's ability to expand its packaging activity and on the potential for new entry into packaging.

Packaging expansion by Albion

4. Albion's filling capacity at its Sandbach site is determined by the total amount of chlorine in the contract with Ineos Chlor and filling/manpower capacity, as well as the availability of packages:
- (a) Albion currently operates 24/7 with one operator per shift. Shift patterns are already in place to optimize capacity. Potential bottlenecks are the availability of packages from distributors and the availability of chlorine from the Ineos Chlor contract within Albion's total balance.
 - (b) [REDACTED]
 - (c) Capacity could be increased (assuming chlorine supply and packaging availability issues are resolved) by installing additional filling points for cylinders and drums. For cylinders, each additional fill point requires the recruitment and training of an additional operator, which would take approximately three months and cost £[REDACTED].
 - (d) Albion's cylinder filling plant was built in 1999 at an approximate cost of £200,000. Ongoing capex requirements are 'minimal' (£5,000 to £10,000 a year).
 - (e) In 2007, Albion packed [REDACTED] tonnes of chlorine at Sandbach. Of this, [the largest proportion] was packed for BOC. If the BOC contract is lost, Albion told us that the remaining volumes are not sufficient to justify continuing the packing operation.
5. Albion acknowledged that, despite running its filling operation on a 24/7 basis, it had around 25 per cent spare capacity. Some of this capacity is used to perform maintenance activities (for example, repairing cylinders) for BOC. Albion suggested that there was no real financial incentive to use this additional capacity.¹

¹Spare capacity is expected to increase after the merger, as a consequence of the loss of the sales to BOC.

6. The evidence we received suggested that Albion would, in counterfactual period, lose its capability to pack chlorine at its Sandbach site following the expiry of its lease on the site. Albion stated that it could potentially build a new packing facility but that this would cost 'several million' pounds due to the need to recreate a chlorine receiving infrastructure and 'require an extensive regulatory approval process'. Albion concluded that it was 'unlikely that such an investment could be justified financially'.

New entry into packaging

7. A packaging facility comprises the following infrastructure: storage tanks, filling machines and connecting pipes. If the packaging facility is distant from the manufacturing plant providing chlorine, a bulk chlorine transport vehicle is required. The vehicle can either be purchased, or leased from third parties.
8. [A third party] (which already has some of the equipment and so would have an advantage compared with other new entrants) told us that it was uneconomic to set up a new plant in the UK and therefore it was highly unlikely to do so. [A third party] considered it more feasible to start importing packaged chlorine from Continental Europe than to set up a new packaging facility in the UK, similarly [another third party] told us that it could be more feasible to start importing from the Continent rather than to set up a new packaging facility, but any (limited) analysis to date had been unclear in indicating which route was preferable in terms of both current and prospective comparative economics.
9. None of the companies we contacted appeared willing to build a new packaging facility in the UK. The main problems highlighted on the costs side concerned sourcing bulk chlorine, Ineos Chlor being the sole UK producer and imports of bulk chlorine from Europe being extremely difficult, as well as the cost and regulatory

approval process involved (ie COMAH registration²), especially in relation to the storage infrastructure. Overall, the financial return for such investment did not appear to be adequate.

10. BOC expressed a similar view. [X]

11. As for the costs involved in setting up a new packaging facility, [a third party] estimated that a new packaging facility could cost several million pounds and a storage tank facility could cost £[X]. [A third party] also provided an estimate of £[X] for the cost of a cylinder filling machine, based on the price paid in 1999. [A third party] and Ineos Chlor estimated the cost of a new bulk chlorine vehicle to range between £[X] and £[X]. [A third party] estimated that a filling plant (and a new sales force) would cost up to £[X].

Other barriers to and costs of entry in distribution of packaged chlorine

12. Other than economic supplies of packaged chlorine (discussed in the previous section), the distribution of packaged chlorine to UK customers (in particular water companies) requires:
 - (a) sourcing packages (ie drums and/or cylinders), if not provided by the customer;
 - (b) securing storage capacity (ie a depot network and/or central depot);
 - (c) regulatory compliance (ie a COMAH registration if needed);
 - (d) purchasing or contracting vehicles to deliver packaged chlorine to customers;
 - (e) customer relationships and the ability to offer appropriate service levels (ie the ability to win contracts, offer training, provide an emergency response etc); and
 - (f) hiring trained staff capable of handling packaged chlorine and a sales force.

²Control of Major Accident Hazards Regulations 1999.

13. In this section, we discuss the existence of barriers to entry in relation to points (a) to (d) above; the costs and time that entry would require; and the views of potential entrants.

Description of barriers to entry

Sourcing packages

14. Drums and cylinders can be purchased either by the distributor or by the customer, although the latter option seems to be far less common. Drums and cylinders have a long physical life but need to be tested every five years. Customers providing their own packages appear to be considered particularly 'valuable' as this reduces the capital investment the distributor must incur.³

Parties' views

15. In relation to the purchase of drums and cylinders, the parties stated that:
- (a) Containers could be purchased new or could be rented from a third party filler.
 - (b) A new entrant could win a contract before investing in new containers.
 - (c) The existence of an active second-hand market in drums and cylinders reduced both the initial investment cost to enter the packaged chlorine distribution market and the part of the investment which was sunk (ie not recoverable in case of exit). To illustrate the existence of a second-hand market, Ineos Chlor said that [X] it sold a number of cylinders and drums to [X], as follows: (i) [X] 71kg cylinders at €[X] per cylinder; and (ii) [X] drums of which [X] were 860kg and [X] were 980kg, at €[X] per drum.
 - (d) A new entrant could convert containers that had been previously used to store other chemicals for chlorine.⁴ The conversion costs include retesting and painting

³Ineos Chlor did not agree with this view, noting that the need to test the packages and perform the routine checks greatly reduced the operational costs benefits.

⁴Ineos Chlor argued that distributors of other chemicals entering the packaged chlorine market might use packages already owned and used for other products instead of buying new packages. BOC told us that for a cylinder previously used for a

the package yellow. BOC told us that it had converted to chlorine cylinders that had previously been used for a number of products in 2000, and in the last 18 months it had converted a number of drums from being used to distribute sulphur dioxide to distribute chlorine at the cost of £[redacted] per drum. However, the sunk cost of entry would be the conversion cost from chlorine back to other gases if a contract was lost. No information has been provided on this.

(e) A new entrant that distributed chlorine in other parts of the world (eg a European distributor of packaged chlorine) could relocate containers used for chlorine to the UK.

(f) [redacted] drums and [redacted] cylinders would be needed to supply [redacted] tonnes of chlorine.

(g) The purchase of packages could be achieved in a maximum of three to six months and, due to the sufficiently long lead times of contract start dates, could be made after contract award, so reducing the need for upfront investment.

16. In their initial submission, the parties estimated the cost of new drums and cylinders (71kg) to be £[redacted] and £[redacted] respectively. However, as shown in Table 1, the package price data provided by BOC was higher than these estimates. The parties estimated second-hand drums and cylinders are estimated to cost approximately 50 per cent of the price of new packages (depending on their age) and considered that approximately 75 per cent of the purchase price of these assets could be recovered in case of rapid exit.

17. When it entered the distribution market, BOC principally purchased new cylinders but it also used cylinders previously used for other gases. It did not appear to have purchased any second-hand.

different type of gas to be used for chlorine all that is required is that it must be tested, and must be painted with the appropriate colour.

Third parties' views

18. Actual and potential competitors considered that the capital investment necessary in drums and cylinders was a significant cost of entry. They provided no indication that they were aware of the existence of a second-hand market. Third parties estimated that cylinders cost around £[redacted] each and drums £[redacted] to £[redacted] each. [A third party] said that the lead time to obtain drums was [redacted] months.

TABLE 1 **Container price estimates**

	£			
	<i>Small cylinder</i>	<i>Large cylinder</i>	<i>Cylinder</i>	<i>Drum</i>
Parties			[redacted]	[redacted]
Ineos Chlor			[redacted]	[redacted]
BOC	[redacted]	[redacted]	[redacted]*	[redacted]†
Air Products	[redacted]	[redacted]	[redacted]*	[redacted]
Albion				[redacted]

Source: BOC, Ineos Chlor, Air Products and Albion questionnaire responses.

*Average small (39kg) and large (71kg) cylinders price.

†Average 2005 and 2007 price (840 litre drums).

Our view

19. Although we observed Ineos Chlor selling some cylinders and drums, we did not see significant evidence of an active and regular second-hand market. In addition, we saw limited evidence that existing distributors of other chemicals might have access to cylinders and drums used for other products as an alternative to buying new packages. We also noted that, even if this substitution were feasible, a necessary condition for such distributors to enter the packaged chlorine market without partially exiting the other chemicals markets was having enough spare package capacity.
20. On the basis of the discussion above, we considered that purchasing new drums and cylinders was the most likely option. We considered that purchasing new containers was not likely to represent an absolute barrier to entry; however, there would be a capital and sunk cost associated with the initial investment required to enter the packaged chlorine distribution business.

Securing storage capacity

21. Distribution requires storage capacity to hold drums and cylinders. This capacity may consist of a single central depot and/or a depot network throughout the country. Distribution from a single site, with deliveries to different customers within a specific geographical area on different days of the week, is called a 'milk round' distribution model.

Parties' views

22. The parties pointed out that setting up a depot network was not necessary for entry, as a new entrant might well adopt the single depot model used by Ineos Chlor (from its Runcorn site) and by BOC for drums (from its Immingham site). The parties did not provide any estimate of the likely costs⁵ and time involved in setting up a central depot or a depot network.
23. The evidence we collected showed that BOC and Air Products had a network of distribution sites for deliveries of packaged chlorine in cylinders and that Air Products used a central depot for drums (Albion's Sandbach site).⁶ Albion delivered drums from the Runcorn site when filled at Ineos Chlor's plant or from its site in Sandbach to customers.

Third parties' views

24. As most water companies require delivery to multiple sites, third parties thought that setting up a distribution system (ie [X]) in the UK was necessary to compete effectively.

⁵The only cost estimate provided relates to the COMAH registration cost discussed in the following section.

⁶Air Products drums are sold to one single-site industrial customer.

25. Gerling Holz confirmed that it would need to have storage facilities in place in the UK in order to meet what it saw as potentially uncertain, short-term demand patterns from UK water companies. Importing and distributing directly to water companies would involve a timelag in shipping delivery which could only be overcome by operating a UK storage facility. Gerling Holz emphasized that it would need sufficient demand ([§]) to justify the expense of entering the UK market in this way (although a detailed estimation of the costs of building a UK storage facility had not been undertaken).

Our view

26. On the basis of the evidence we received, it seemed that either a depot or network of depots in the UK was likely to be necessary for a would-be distributor (including a European entrant) to be competitive.

27. The depot structure would depend on the business model of the potential entrant.⁷ For example, if an entrant distributed a portfolio of products, a depot network would seem to be preferable. Further, the depot structure would depend on whether a distributor would be specializing in drums or cylinder distribution.

Regulatory compliance

28. Chlorine is a toxic substance and for safety reasons the chlorine industry is highly regulated through production and storage site registration requirements and transport restrictions.

29. We examined the following relevant regulations:

⁷We noted that a potential entrant might already have an existing network which it could use but also noted that the regulatory requirements specific to chlorine would need to be met for any such depots to store chlorine.

- (a) *COMAH registration requirements* for chlorine storage sites, which is awarded (subject to approval) by the Health and Safety Executive (HSE) and the Environment Agency;
- (b) *transport regulation requirements* for packaged and bulk chlorine transport, particularly:
- (i) *ADR* (ie European Agreement concerning the International Carriage of Dangerous Goods by Road) *requirements* for chlorine transportation;
 - (ii) *RID* (the Intergovernmental Organisation for International Carriage by Rail's Regulation concerning the International Carriage of Dangerous Goods by Rail) *requirements* for chlorine transportation; and
 - (iii) carriage of dangerous goods by sea, air and inland waterway; and
- (c) other regulatory regimes, including *REACH* (EU regulation concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals) and Euro Chlor policy, as well as the regulation of the water industry and discussion of dual-sourcing requirements for water company customers.

30. The focus of this section of the appendix is on the requirements of COMAH regulations, identified by main and third parties as the key regulatory framework surrounding the storing of chlorine for either packaging or distribution. In particular, we consider the implications of the COMAH registration requirements for new entrants or overseas competitors potentially entering the UK market for the distribution of packaged chlorine.⁸

31. [REDACTED], Albion and [REDACTED] all have at least one upper tier site (at [REDACTED],[REDACTED] and [REDACTED] respectively). [REDACTED] has no upper-tier COMAH sites in the UK but has 15 lower-tier

⁸There are three tiers of COMAH registration. First, sites that maintain levels of chlorine below 10 tonnes do not need a COMAH registration. Second, sites storing between 10 and 25 tonnes of chlorine need a 'lower tier' COMAH registration, which in turn does not require a COMAH report. Third, storing over 25 tonnes of chlorine requires a 'top tier' COMAH registration and a COMAH report every five years.

sites (although none of the sites holds the lower tier quantity (10 tonnes) of chlorine).

[X] also stores its drums ([X]) at [X] site.

Parties' views

32. With respect to the COMAH registration being potentially necessary to distribute packaged chlorine, the parties argued that:
- (a) only one top-tier COMAH site was necessary ([X]), by keeping all the other sites' inventories below 10 tonnes;
 - (b) no COMAH site might be needed if the bulk of the stock of drums and cylinders was held at a third party filler site, which would itself be a top tier COMAH site;
 - (c) distributors of other chemicals might only need to upgrade their COMAH registration rather than invest from scratch; and
 - (d) European distributors serving UK customers directly from the Continent needed no COMAH registration.
33. The parties estimated the average cost of a COMAH report for a top tier site at approximately £[X] every five years.⁹ This is based on [X]'s experience with reports covering multiple products. The parties considered that the cost of a report for chlorine only would be lower. The parties then specified that around £32,500 was the cost a UK chemical distributor would incur to upgrade an existing top tier COMAH site to include chlorine, whilst the cost of such upgrade for a UK distributor of industrial gases would be lower, ranging between £12,500 and £17,500.
34. Ineos Chlor argued that the timing involved in obtaining a COMAH registration was dependent upon, among other things, the location of the proposed facility and the current use of the land. Ineos Chlor estimated that BOC could obtain the necessary

⁹Ineos Chlor seems to suggest that £[X] is the cost for an upgrading of a top tier site to include packaged chlorine among the other products already stored.

registration to operate the Target Business within four weeks, the site being already COMAH registered. The parties considered that the time required for an upgrade of an already existing top tier COMAH site to include chlorine would be less than the time taken for BOC's full five-year report at Immingham, which BOC told us was three to six months. The parties also suggested that in case of a UK distributor of industrial gases the timescale involved for an upgrade would be only around one month.

Third parties' views

35. Actual and potential competitors considered that securing a COMAH registration was one of the main barriers to entering the UK packaged chlorine distribution business. The concern relates both to the cost of having a COMAH registered storage facility and the time needed to obtain such registration. [A third party] estimated the cost of a top tier COMAH registration to be around £[REDACTED], whilst [another third party] estimated it would cost in excess of £[REDACTED] including management costs.
36. Studies conducted for the HSE showed that there can be significant costs associated with gaining COMAH regulation and compliance. These studies suggested that the cost for a top-tier site for the analysis and report writing would be approximately £130,000, with ongoing annual costs of about £20,000 from year two onwards.¹⁰ The cost for a lower tier site was estimated to be about £15,000 to £17,000 initially, with ongoing costs of about £2,000 a year, although we noted that a distributor adopting a multi-site model might require multiple lower tier COMAH sites to deliver a competitive level of customer service.¹¹

¹⁰The parties told us that the HSE reports referred to generic costs and overestimated the true cost.

¹¹These costs reflect the costs of compliance (ie analysis and report writing to achieve COMAH compliance) and exclude additional costs associated with covering expenses for Competent Authority staff during assessment.

37. Third parties considered that the time involved ranged from several months to two years.

Our view

38. On the basis of the evidence we received and the analysis set out in the following paragraphs, it appeared that:

(a) having at least one top tier COMAH registered site was likely to be necessary to store the bulk of the stock of cylinders and drums. This registration would be essential if the central depot model were adopted by a new entrant;

(b) the costs of COMAH regulation and compliance were potentially significantly higher than the parties suggested; and

(c) the time required to obtain a COMAH registration could be significant.

39. In relation to point (a) above, assuming a new entrant were to hold a 10 per cent market share of packaged chlorine, this would imply an annual supply of approximately [REDACTED] tonnes of packaged chlorine. Evidence submitted by Albion suggested that, on average, it maintained [REDACTED] stock of chlorine in a mix of package combinations at its Sandbach facility. On this basis, a distribution facility would need to store at least [REDACTED] tonnes of packaged chlorine at any one time—this would be at the upper end of lower tier COMAH registration. However, Albion also observed that it currently stores at least [REDACTED] in order to maintain security of supply to its customers, while BOC, in its presentation on business continuity, noted that it held [REDACTED] stock ([REDACTED] tonnes) at its Immingham and other distribution sites across the UK. On this basis, it is likely that, to be competitive, a storage facility would need to have top-tier COMAH registration.

40. We understand that an alternative to a new distributor setting up its own site could be holding the bulk of the stock at the third party filler site. BOC told us that Simon

Storage gave it a quotation for chlorine storage. We contacted Simon Storage which told us that it did not currently store packaged chlorine, and its ability to do it depended on the volumes and the implications for COMAH registration etc. We have seen limited evidence of this approach and no third party has proposed this as an entry route. Air Products stores drums at Albion's Sandbach site, although it should be noted that the stock of drums held is very small [REDACTED]. Air Products told us that there was no stand-alone charge for the storage of the few drums at Albion Sandbach as the storage element was included in the cost of chlorine and filling. It could not store drums at any of its UK facilities as none of Air Products' depots had COMAH clearance to hold anything larger than its largest cylinder.

Purchasing or contracting vehicles

41. Distribution of packaged chlorine in the UK is carried out by road trucks. The vehicles (and manual handling techniques) differ between cylinders and drums: cylinders tend to use trucks with a tail lift, while drums use a flat-bed vehicle with no specific loading equipment as customers have either loading equipment or forklift trucks.
42. Distributors can provide a delivery service to customers either using their own vehicles or by contracting a third party haulier. This second option is used, for example, by [REDACTED], which delivers packaged chlorine to end customers using the haulage company [REDACTED].

Parties' views

43. In relation to trucks, the parties stated that:
 - (a) vehicles were not specific to the transport of packaged chlorine. In particular, distributors of industrial gases and other commodity chemicals either did not need to invest in new trucks or might only need to convert existing trucks, for example by adding tail lifts to be able to transport cylinders; and

(b) the possibility of using contract haulage companies instead of directly investing in trucks reduced the initial investment required to distribute packaged chlorine.

44. In relation to the likely costs involved, we only received estimates from the main parties. The parties estimated that a truck conversion to include a tail lift would cost around £[REDACTED]. The parties provided no estimate of the likely costs of new vehicles.¹² Evidence on the costs of a third party haulage service is examined in Appendix F.

Our view

45. On the basis of the evidence received, it seemed that, of itself, purchasing or converting vehicles to deliver packaged chlorine was not likely to represent an absolute barrier to entry in the packaged chlorine distribution business.
46. However, the capital cost involved could be significant if new vehicles were purchased or many trucks were converted (this in turn would depend on the scale of entry, the geographic distribution of customers/deliveries, the size of the sites to be served, etc). We also acknowledged that contracting a third party haulage company could be a valid alternative.

Potential entrants

47. We also considered evidence from a report prepared for BOC on entry and responses from potential entrants.

Chemagility Report prepared for BOC

48. [REDACTED]

¹²The only information we have on new vehicle prices relates to the cost of vehicles transporting bulk chlorine, which Ineos Chlor estimated at approximately £[REDACTED] and Albion approximately £[REDACTED].

49. The Chemagility Report argued that entry into the packaged chlorine distribution business by distributors of speciality gases was unlikely.¹³ It concluded that the list of potential entrants included: [REDACTED].

Third parties' entry plans

50. We contacted the following companies, including all the potential entrants identified by the Chemagility Report: [REDACTED], among others set out in Table 2. No third party told us that it had plans to enter at the distribution level.

TABLE 2 Potential entrants successfully contacted by the CC

<i>UK-based industrial gases/commodity chemicals distributors</i>	<i>Continental European supplier active in chlorine</i>
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]

Source: CC.

Notes: [REDACTED].

51. [Third party A] and [third party B] stated that they were not considering entry/ expanding into the UK packaged chlorine distribution market (whether at pre-merger or at post-merger prices). [Third party A] considered entry unprofitable given the high transport cost of exporting from Europe.¹⁴ Its history of attempted entry is described in the following section. [Third party B] told us that the business was not profitable and there were no cost synergies with the other products it offered, as chlorine required separate management.

52. On the other hand, [third party C] and [third party D] told us that they might consider entering/expanding into the packaged chlorine business in the UK as a part of a product portfolio expansion strategy. For [third party C], due to very high regulatory

¹³Section 3 quotes: 'Getting involved in the distribution of packed gases is not as straightforward as distributing factory packaged goods and most speciality distributors would be unlikely to be involved with supplying chlorine gas. However, some of the full-line and commodity distributors have the logistical expertise and the resources to do this'.

¹⁴Gerling Holz would still consider entry as a second supplier.

costs associated with a COMAH registration, retail prices for packaged chlorine would need to increase significantly in order to make such entry profitable. [Third party D] to date has not carried out any analysis on the economic viability of such expansion.

Gerling Holz entry attempts

53. We consider it useful to outline Gerling Holz's recent entry attempts in the UK packaged chlorine market and the possible reasons for their failure. The evidence we have collected shows that Gerling Holz has followed two different entry strategies:
- (a) direct distribution to end customers (as main supplier and as a back-up supplier);
 - and
 - (b) a partnership with Albion, with Gerling Holz supplying Albion at the wholesale level and Albion carrying out the distribution activity in the UK.
54. In relation to the first strategy, in the last two years Gerling Holz has approached [REDACTED] regarding distributing packaged chlorine directly imported from Continental Europe (Germany) to them.¹⁵ In relation to the offer made to [REDACTED].¹⁶
55. Gerling Holz told us that this entry strategy (at least in its latter stages) was mainly built around providing water companies with security of supply (in the context of there being only one chlorine manufacturer in the UK) in the full knowledge that it was highly unlikely that it would be able to compete on price. This seems to indicate that, contrary to the parties' assertions, although limited quantities of imported chlorine would be of interest to UK water companies, this would be on strategic rather than on economic grounds.

¹⁵[REDACTED]
¹⁶[REDACTED]

56. [REDACTED]¹⁷

57. [REDACTED]

Analysis of costs

58. We carried out an analysis of the costs associated with entry into the distribution of packaged chlorine relative to the revenues that could be generated. The main results of this analysis are summarized in this section.

59. Table 3 summarizes the costs of entry based on main and third parties' estimates.

TABLE 3 **Cost estimate comparisons***

	£	
	<i>Low estimate</i>	<i>High estimate</i>
Cylindert	[REDACTED]	[REDACTED]
Drum†	[REDACTED]	[REDACTED]
Truck conversion	[REDACTED]	[REDACTED]
COMAH registration	[REDACTED]	[REDACTED]

Source: Third party questionnaire responses.

*Refer to the text for references.

†Refer to Table 1 for details on container prices.

60. The parties argued that, based on supplying [REDACTED] tonnes of packaged chlorine a year (assuming a typical mix of drum and cylinder deliveries), the 'sunk' costs involved in expanding into packaged chlorine would be between [REDACTED] and [REDACTED] per cent of the revenues an entrant could reasonably expect to generate in the first two years of operation.

61. We replicated this analysis based on our figures and also examined the costs associated with gaining a market share of 10 per cent (scenario 2, [REDACTED] tonnes a

¹⁷[REDACTED]

year)¹⁸ and 30 per cent (scenario 3, [REDACTED] tonnes a year).¹⁹ To simplify the analysis, we assumed that only 980kg drums and 71kg cylinders were distributed. In each scenario, we set out a low estimate, mid estimate and high estimate, reflecting different perspectives on the level of COMAH regulation/compliance required.

62. In light of the discussion above we considered the most likely scenario to be the supply of [REDACTED] tonnes a year with a single top tier site. In this case, as shown in Table 4, the costs of entry represent [REDACTED] per cent of the first two years' revenues, an estimate exceeding those suggested by the parties.

TABLE 4 Main costs of entry for [REDACTED] tonnes a year

1,000 tonnes/year assumed volume

	<i>Low estimate</i> £			<i>Mid estimate</i> £			<i>High estimate</i> £		
	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Revenue	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Costs of entry:									
—COMAH	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
—Cylinders	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
—Drums	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
—Truck conversion	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total costs of entry			[REDACTED]			[REDACTED]			[REDACTED]
% of revenue at current prices			[REDACTED]			[REDACTED]			[REDACTED]

Source: CC analysis.

Notes:

1. Based on main parties' assumed current prices (£[REDACTED] per tonne for drums, £[REDACTED] per tonne for cylinders).
2. Excludes costs such as raw materials, filling costs, costs associated with building UK plant or depot facilities, training costs and sales and marketing costs.
3. Assumes that demand for [REDACTED] tonnes can be achieved from the point of entry.

63. We also noted that this cost analysis was based on the main parties' estimates for new drum and cylinder costs. As illustrated in Table 3, these may actually underestimate the costs of procuring new packages, further increasing the costs associated with entry.

¹⁸Gerling Holz has suggested that sales of at least [REDACTED] a year would be required for it to consider viable expansion.

¹⁹Air Products suggested that a minimum level of [REDACTED] tonnes a year would be required to justify investment in a new filling station in the UK.

64. Having examined the principal costs of entry, we added in additional costs that might be incurred by a market entrant. These additional costs are likely to include raw materials, filling costs, costs associated with any premises/plant required in the UK, and also transport costs within the UK. Table 5 provides an overview of these additional costs for [REDACTED] tonnes a year demand.

TABLE 5 Further costs for [REDACTED] tonnes a year

[REDACTED] tonnes/year assumed volume

	Low estimate £			Mid estimate £			High estimate £		
	Year 1	Year 2	Total	Year 1	Year 2	Total	Year 1	Year 2	Total
Revenue	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Costs of entry	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Other costs	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Raw materials	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Filling	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
UK facilities	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
UK transport	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
Total costs			[REDACTED]			[REDACTED]			[REDACTED]
% of revenue at current prices			82%			85%			91%

Source: CC analysis.

65. The key assumptions we made in calculating these costs include:

- (a) the price of bulk chlorine: this was estimated to be [REDACTED], based on the midpoint of the price range for chlorine provided by Air Products;
- (b) filling costs: estimated to be [REDACTED] for 980kg drums and [REDACTED] for 71kg cylinders;²⁰
- (c) UK facilities costs: we assumed a cost of £500,000 to put in place appropriate facilities in the UK, depreciated over 20 years.²¹ We noted that cost estimates for a packaging plant varied substantially in evidence we received and we received no evidence on estimated costs for a simpler storage facility;
- (d) UK transport costs: while the costs discussed earlier included costs for the conversion of trucks, we also included estimates of actual transportation within

²⁰Based on Air Products' estimates. See also Appendix F for further detail. These costs would reflect the costs incurred by an entrant at the packaging level. However, these would also be costs faced by an entrant at the distribution level as such an entrant would need to acquire pre-packaged chlorine.

²¹We assumed a straight-line depreciation methodology over what would be a relatively long expected life of such an asset (20 years). Given the difficulty in estimating a residual value, we assumed negligible value after 20 years, although we acknowledged that this may be overly simplistic.

the UK to end customers. These are based on estimated costs of [£] for 980kg drums and [£] for cylinders provided by Exel Europe;²² and

(e) we did not receive any evidence on costs associated with sales and marketing activities that might be required to support entry/expansion into the UK market, so these costs were not included in our analysis.

66. Based on our high estimate for demand of [tonnes] a year, total costs would represent approximately 90 per cent of the first two years' revenues. This would suggest that, potentially, there is some margin to be made from entry but that such a margin may not be an overly compelling proposition for a new entrant to the market.²³ As we note in our assumptions above, additional costs such as sales and marketing costs were excluded from our analysis. The inclusion of such costs would further erode potential margins.²⁴

Barriers to and costs of expansion in distribution of packaged chlorine

67. In this section, we consider the potential barriers to, costs for and timing of expansion. Expansion refers to an existing business already active in the distribution of packaged chlorine in the UK expanding its sales volumes.

Expansion by existing UK distributors

68. Distributors currently active in the UK packaged chlorine market, apart from BOC and Ineos Chlor, are Albion, Air Products and more recently Gerling Holz.

69. Albion stated that to expand its capacity to sell packaged chlorine meant:

²²Air Products estimated that UK transport costs were £[] for a large drum and £[] for a large cylinder. See Appendix F for further discussion on UK transport costs.

²³For example, Air Products suggested that, in Europe, it aimed to achieve a margin of at least [] to [] per cent

²⁴As outlined in our assumptions, this analysis is based on a cost of raw materials (chlorine) of €[] per tonne (£[] at current exchange rates). We noted that this was significantly higher than the £[] assumed in the main parties' evidence. Applying a lower raw material cost to our analysis would result in total costs representing approximately 78 per cent of revenues in the high estimate for demand of [tonnes] a year. However, we considered that it would be difficult for a new entrant to secure chlorine at such a low price.

- (a) reducing sales of other chlorine consuming products from within the supply agreement with Ineos Chlor;
- (b) purchasing additional drums (it estimated that new drums would cost £[redacted] each);
- (c) buying sufficient cylinders to service one or more customer contracts;
- (d) purchasing or contracting the vehicle assets to supply customers; and
- (e) time taken to win customer contracts (we noted that water companies typically tendered for a minimum three-year period).

70. Air Products told us that the main issues involved in expanding its packaged chlorine volumes were:

- (a) procuring new drums, which would cost around £[redacted] each and have a likely lead time of six to nine months (Air Products already has cylinders); and
- (b) setting up a new contract for specialist drum delivery vehicles, as [redacted] depots cannot hold drums; or obtaining a COMAH registration to hold drums at any of its storage sites, which would take approximately 18 months.