

AGGREGATES, CEMENT AND READY-MIX CONCRETE MARKET INVESTIGATION

Working paper on barriers to entry and expansion

Summary

1. In assessing barriers to entry and expansion, the CC considers features of the market that may prevent or restrict companies from exploiting profitable opportunities in a market and hence enable existing suppliers persistently to raise prices above costs without significant loss of market share. This working paper sets out our assessment of the barriers to entry and expansion in the markets for aggregates, cement and RMX. In this paper, the term 'Majors' is used to refer to Aggregate Industries UK Limited (Aggregate Industries), Cemex UK Operations Limited (Cemex), Hanson, Lafarge Aggregates Limited and Lafarge Cement UK Limited (Lafarge), and Tarmac Group Limited (Tarmac).

2. We set out the evidence for the existence of barriers to entry and expansion as follows:
 - (a) aggregates (paragraphs 16 to 73);
 - (b) cement (paragraphs 74 to 123); and
 - (c) RMX (paragraphs 124 to 139).

Aggregates

3. In relation to primary aggregates, our preliminary views are:
 - The availability of aggregate resources is not a barrier to entry. Although it is generally not economic to transport aggregates over long distances, the evidence suggests that there is substitutability between crushed rock and sand and gravel in a considerable proportion of general construction end uses so that access to crushed rock or sand and gravel specifically is usually not important for such

applications. There may be specific issues in relation to aggregates for RMX and asphalt production, and for specialist aggregates which are less widely available.

- The time required to identify and acquire a suitable site and to obtain planning permission limits the competition faced by existing aggregates producers over the medium term from operators entering the market by developing new sites.
 - It is likely to be easier, faster and cheaper to expand an existing site, either by increasing its output or by extending the site, than to develop a new site because the planning process is simpler and much of the required equipment will already be in place. This gives existing producers an incumbency advantage over new entrants. We found that the majority of planning applications for primary aggregates sites concern the extension of existing sites rather than new sites.
 - While there can be a considerable cost in developing an aggregates site, the cost need not be prohibitive, particularly for small-scale sites, if the land and mineral rights are leased. A small-scale crushed rock site could be established at a capital cost of between £1.4 million and £10.4 million and a small-scale sand and gravel site could be developed with a lower level of investment of between £0.3 million and £4.0 million.
4. In relation to marine aggregates, our initial view is that licensing and capital outlay considerations create barriers to entry similar in scale to those created by the planning process and capital requirements to enter the land-based aggregates market.
5. Secondary aggregates production requires a steady supply of secondary material, which tends to arise in specific geographical areas, and the supply of material for recycled aggregates in a given area depends on the level of construction and demolition activity in that area. However, overall we consider that the barriers to entry into the production of secondary and recycled aggregates are considerably lower

than for primary aggregates as there are fewer planning restrictions and less capital investment is required.

Cement

6. Our preliminary conclusions are that the time required to identify and acquire a suitable site and to obtain planning permission mean that any new entry into the production of cement would be subject to a long lead time, and that since the capital cost of establishing a cement works would be at least £120 million, and probably closer to £200 million, small operators would not be able to undertake such an investment. Existing cement producers benefit from technical experience and know-how compared with new entrants. In addition, given the weak demand in the market and ability of existing producers to expand output from plants which are currently not operating at full capacity, we consider it unlikely that new entry would be attractive.
7. We also found that the cost of additional plant, obtaining regulatory permissions and securing sufficient limestone reserves to service the additional capacity are barriers to increasing the capacity of an existing cement plant.
8. Entering the cement market by establishing a grinding station (where clinker from the cement kiln is ground into the fine powder that is cement) also requires substantial capital investment. Entering the market by importing cement has lower barriers in terms of capital cost. For these entry routes, a reliable source of supply for clinker or cement must be secured at an acceptable price. For imports, there will be an additional transport cost compared with UK-produced cement.
9. The potential market available to independent cement producers and importers has reduced over the last 20 years because the major aggregates and cement producers have integrated vertically into RMX production and supply their RMX plants with their

own cement, and this has made the addressable market smaller which may be less attractive to new entrants.

RMX

10. Our preliminary conclusion is that barriers to entry in the RMX market are low given the low capital investment required, lack of economies of scale and low regulatory barriers. The use of volumetric trucks enables entry at a small scale with a limited investment. In our view, the structure of the market, with the integrated Majors as well as some regional players who are vertically integrated between aggregates and RMX, increases the risk and uncertainty over the supply of key inputs for new entrants. The market structure might therefore deter new entry, particularly in regions where the extent of vertical integration is greatest.

The draft 'Guidelines for market investigations'

11. Paragraph 190 of the draft 'Guidelines for market investigations'¹ (the draft Guidelines) states that in a market investigation the CC will usually consider theories that restrictions on entry or expansion may be eliminating or reducing a major source of competitive discipline on market incumbents.
12. The draft Guidelines identify two broad reasons for assessing restrictions on entry or expansion:
 - (a) Paragraph 192: 'Entry in its various forms (and sometimes just the threat of entry) can stimulate competition and negate any competitive harm flowing from other sources.'
 - (b) Paragraph 193: 'Entry restrictions may [thus] lead to an AEC [adverse effect on competition] because they prevent the benefits of entry materializing. The restrictions of any type can be defined as any feature of the market that gives

¹ www.competition-commission.org.uk/assets/competitioncommission/docs/2012/consultations/market_guidelines_main_text.pdf

incumbent suppliers a cost or other advantage over efficient potential entrants.

The restrictions can prevent entry absolutely or can delay it for such a long period of time as to be tantamount to an absolute restriction.’

13. In addition, paragraph 163 states:

- ... The prospect of entry can sometimes offset an AEC that would otherwise arise, notably from weak rivalry within the market, horizontal coordination or vertical relationships. Despite present adverse effects in a market, in the longer term competition may be affected as new firms enter, or market participants take actions to enhance their ability to compete against established incumbents. ... So long as there are no significant barriers to entry into the market under consideration, the CC may consider there is no AEC, where either:
 - actual entry is judged to be likely, of a sufficient scale and swift enough to constrain incumbent firms in the near future; or
 - the CC considers that the threat of potential entry is sufficient to exercise a constraint even though no actual entry has been observed in the recent past. This could be the case when entry would be quick and costless so as to take advantage of an opportunity afforded by a price rise in the market.

14. Paragraphs 196 to 210 of the draft Guidelines identify three broad categories of restrictions to entry and expansion:

- natural or intrinsic barriers are those which relate to the cost of putting the production process in place, gaining access to essential facilities or inputs and the acquisition of any necessary intellectual property rights;

- strategic barriers which result from existing companies in the market acting to deter entry by reducing post-entry profitability, and other ‘first mover’ advantages which arise from the established position for the incumbent companies in the market; and
- regulatory barriers, which are construed broadly to include intellectual property law, the planning regime, voluntary or compulsory standards, codes of practice, health and safety standards and licensing requirements.

Relationship between our theories of harm and barriers to entry

15. The Statement of Issues² sets out the theories of harm (ToH) that we have identified in relation to this investigation that describe how possible market characteristics could give rise to an AEC. In order to provide context for the assessment of barriers to entry and expansion in this paper, we summarize the relevance of barriers to entry and expansion to our ToH as follows:

- ToH 1—high levels of concentration and barriers to entry mean that suppliers can exercise unilateral market power: the ability of incumbent companies to exercise market power and raise prices or reduce the quality of other aspects of their offer can only be sustained if there are barriers to entry or expansion; and
- ToH 2—coordination between producers reduces or prevents competition: coordination is only sustainable if externally stable so that the threat of entry and/or the threat of expansion by fringe players is not sufficient to prevent the exercise of market power by the coordinating group.

² www.competition-commission.org.uk/assets/competitioncommission/docs/2012/aggregates-cement-and-ready-mix-concrete/issues_statement.pdf.

Aggregates

16. In this section, we consider factors relating to entry and expansion first for primary aggregates (land-based aggregates (including specialist aggregates) and marine aggregates) and secondly for recycled and secondary aggregates.

Primary aggregates: possible modes of entry and expansion

17. We identified the following possible modes of entry and expansion:
 - (a) developing or expanding a land-based aggregates site;
 - (b) developing or expanding a marine aggregates dredging operation; and
 - (c) developing or expanding an import operation.

18. Cemex commented that entry did not necessitate extraction of aggregates by the new entrant as merchant hauliers were able to enter the market with only a truck with which to collect and transport aggregates from quarries or wharves to a customer. As a merchant haulage operation concerns the transport of aggregates that have been quarried and does not increase the volume of aggregates available in the market, we do not propose to analyse barriers in relation to haulage operations.

19. Imports of aggregates account for a small proportion of the total supply of aggregates in England (4 per cent in 2005), therefore we do not propose to analyse barriers in relation to imports. The low proportion of imported aggregates is accounted for by the nature of aggregates which are in general low-value, heavy commodities, and as such transport costs make imported aggregates uncompetitive compared with domestically-quarried aggregates sourced close to the end market. We received evidence indicating that importing aggregates is viable only for higher-grade aggregates for specialist applications or in certain geographic areas where there is no transport cost disadvantage. The British Aggregates Association (BAA) told us that it

was aware of crushed rock and armour stone (large blocks of rock) being imported from Norway for rail ballast and sea defences respectively. [✂]

Primary aggregates: history of entry and exit

20. According to the Mineral Products Association (MPA), there were 335 primary aggregates producers in Great Britain in 2008.

21. Table 1 shows the total number of land-based aggregates sites that were opened and closed between 2008 and 2011. The table also shows the number of sites that were opened and closed by the Majors, which demonstrates that non-Majors accounted for the majority of sites opened and closed during this period.

TABLE 1 **Aggregates sites opened and closed in the UK, 2008 to 2011**

	2008	2009	2010	2011	Total
Total sites opened	39	32	38	32	141
Sites opened by the Majors	8	1	6	5	20
Total sites closed	55	65	55	57	232
Total sites closed by the Majors	22	37	35	24	118

Source: CC analysis.³

22. Of the 141 aggregates sites opened between 2008 and 2011, 43 per cent were crushed rock sites, 55 per cent were sand and gravel sites and 3 per cent were combined crushed rock and sand and gravel sites.

23. The MPA noted that annual surveys of its members between 2000 and 2008 found that in England, Scotland and Wales there were 314 planning applications to develop or extend sites for the extraction of crushed rock or sand and gravel. 17 per cent of these planning applications were for new sites and 83 per cent were for extensions of

³ CC analysis based, in the case of the Majors, on plant lists provided to the CC by the Majors, and in the case of the independents, on reports by BDS Marketing Research Limited. We note that submissions to BDS are voluntary, therefore the data may not capture all sites opened and closed by independents. We also note the following: (a) sites that are inactive/mothballed in one year and active the next year will show as a site opened in the second year; and (b) when quarrying is started on a site that is not part of the original excavation, it may be captured in the data as a new site.

existing sites. 75 per cent of the planning applications related to sand and gravel sites and 25 per cent to crushed rock sites. The MPA commented that it was unsurprising that most planning applications were for the extension of existing sites given that most quarry operations were long term in nature, operators generally aimed to maximize the recovery of aggregates from a site, and planning authorities typically released areas of a site for extraction in incremental stages.

24. In relation to marine aggregates, according to the British Marine Aggregates Producers Association (BMAPA) (based on information on The Crown Estate website⁴) there are 14 companies active in marine dredging who together operate 27 vessels in 70 production licence areas (Hanson, Tarmac and Cemex are the most active operators, with licences to dredge in 20, 18 and 10 areas respectively) and that there are 62 licence applications currently outstanding, of which 21 have been submitted by Cemex, 14 by Hanson and 13 by Tarmac.

Primary aggregates: possible barriers to entry and expansion

25. Although marine aggregates are classified as primary aggregates, for clarity we first discuss possible barriers to land-based primary aggregates production and then we discuss possible barriers to marine aggregates production. In relation to land-based primary aggregates, we consider the following factors:
- (a) availability of greenfield sites (paragraphs 27 to 34);
 - (b) planning permission process (paragraphs 35 to 44);
 - (c) capital cost (paragraphs 45 to 47);
 - (d) economies of scale (paragraphs 48 to 53); and
 - (e) barriers to expansion (paragraphs 54 to 58).

⁴ www.thecrownestate.co.uk/marine/aggregates/our-portfolio/.

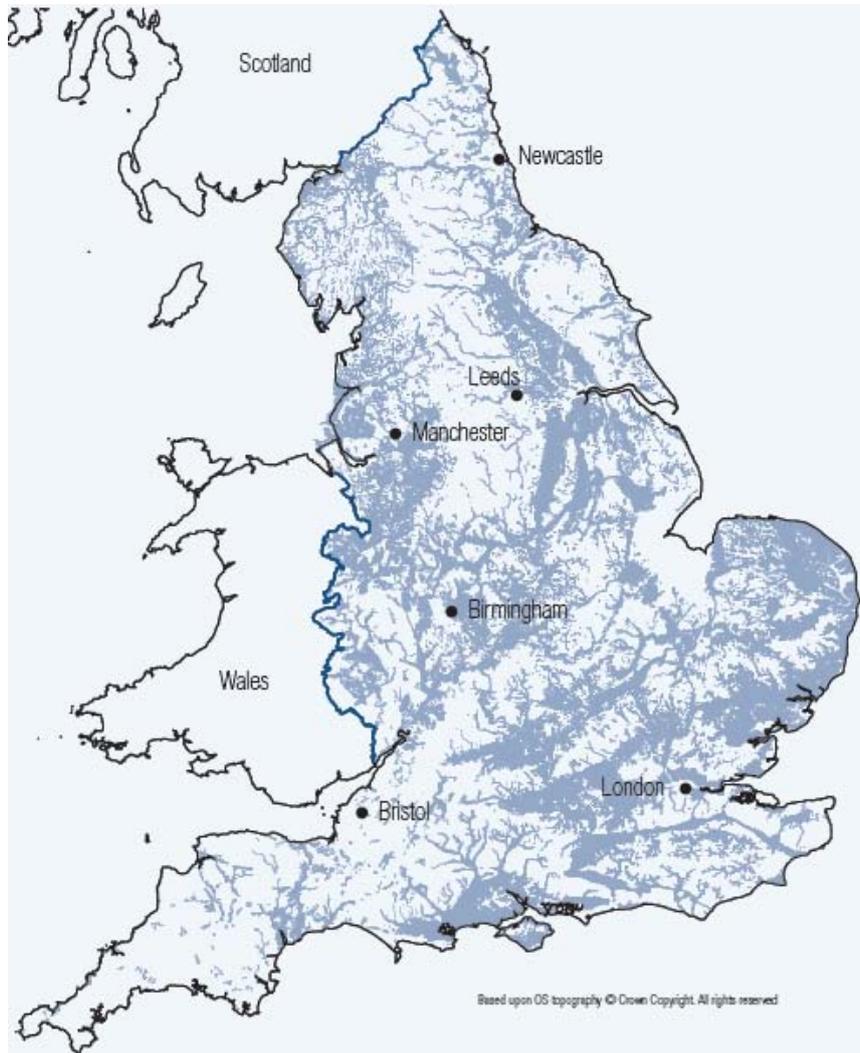
26. Our assessment has looked at factors likely to apply generally in the UK. Concerning the relevance of regional variations in barriers to entry and expansion, Hanson and Tarmac told us that their views were that the only regional factor was the geographic distribution of aggregates and that not all aggregate types occurred in every region; Aggregate Industries noted that markets in certain areas might be affected if transport links constrained an operator's ability to deliver efficiently and effectively to those markets; and Lafarge commented that the cost of obtaining mineral rights and planning permission depended on the site location and that in some areas planning permission was more likely to be withheld if a scheme were opposed.

Availability of greenfield sites

27. The availability of primary aggregates is determined by geology as particular types of primary aggregate can be extracted only where they occur naturally. Figures 1 and 2 show that in England, hard rock is predominantly found to the north of a line (known as 'the rock line') that runs from the south west in Devon and Somerset to the north of Norfolk and south of Lincolnshire, whereas sand and gravel is more widely distributed.

FIGURE 1

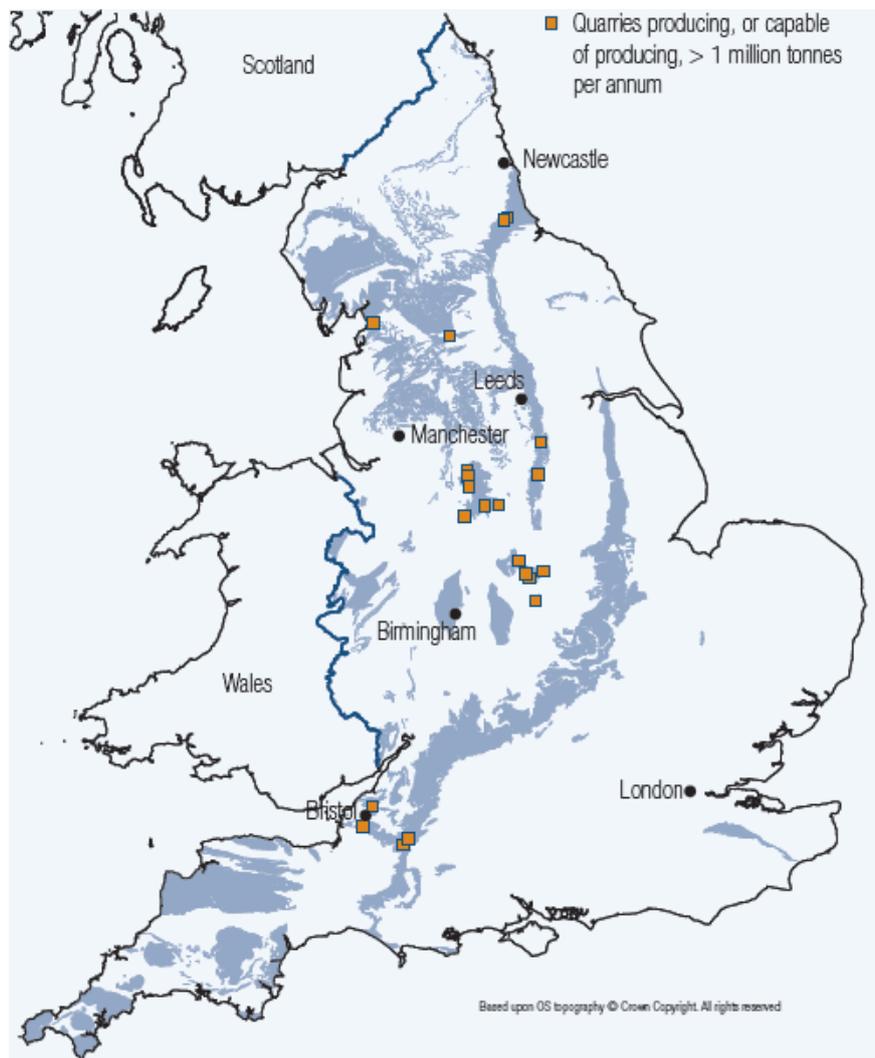
Distribution of sand and gravel resources in England



Source: Mineral Products Association.

FIGURE 2

Distribution of rock resources in England



Source: Mineral Products Association.

Views of the parties

28. Tarmac highlighted the availability of sites having the required geology as a key barrier to entry for the production of primary aggregates.

29. Aggregate Industries noted that different grades of aggregate could be produced from crushed rock quarries and sand and gravel quarries and each quarry tended to produce multiple grades, and there was therefore a high degree of demand-side

substitutability between aggregates from crushed rock quarries and aggregates from sand and gravel quarries.

30. Hanson told us that the geographic distribution of aggregates resources only illustrated that there might be a limit on the availability of mineral reserves of one type in any area. Hanson suggested that this should not be considered as a barrier to entry in the production of aggregates as there was considerable substitutability between rock and sand and gravel in end-uses, and that the market in any area tended to be defined by the available resource in that area (for example, in a locality in which sand and gravel was the dominant resource, the lack of rock would not constitute a barrier to entry in that market).
31. Hanson noted that while the non-availability of mineral-bearing land close to centres of demand might be a barrier, it was not a uniform barrier, and that areas where such land was not readily available would be more susceptible to supplies from further afield. Hanson also noted that land suitable for specialist aggregates production was more limited, but such aggregates could be transported further and so having access to suitable mineral resources near centres of demand was less important for such specialist aggregates.
32. The MPA told us that while sand and gravel aggregates accounted for about 35 per cent of production in the UK and crushed rock accounted for about 65 per cent, these proportions varied significantly across the country depending on what could be accessed locally. The MPA said that producers were generally able to use locally-available materials to meet required standards as viable substitutes existed for most types of aggregates. The MPA noted that in recent years there had been a shift from restrictive ingredient-defined specifications for the production of concrete towards standards based on the concrete's performance. The MPA noted that there were

some aggregate materials that were not substitutable, such as those used for high-PSV⁵ standard road surfacing and rail ballast.

33. The MPA told us that aggregates generally needed to be sourced close to the intended end-market because the viable area for distribution from depots was around 30 miles. The MPA noted that companies (typically non-major aggregates producers) that used their vehicles to 'back-haul' other loads once their aggregates had been delivered could justify transporting aggregates for longer distances, and that specialist aggregates, such as high-PSV stone, which were essential for certain projects could be transported economically for up to 100 miles.

Preliminary conclusion

34. Our initial view is that the availability of aggregate resources is not a barrier to entry. Although it is generally not economic to transport aggregates over long distances, the evidence suggests that there is substitutability between crushed rock and sand and gravel in a considerable proportion of general construction end-uses (see paragraphs 21 to 26 of the market definition working paper⁶) so that access to crushed rock or sand and gravel specifically is usually not important for such applications. Availability may be more of a barrier to entry in relation to aggregates for higher-specification RMX and asphalt production, and specialist aggregates which occur less widely.

Planning permission process

35. We consider the planning permission process in a separate working paper on policy and regulation to be published in due course.

⁵ PSV stands for polished stone value. The higher the PSV of a particular aggregate, the greater the skid resistance of the asphalt produced using that aggregate.

⁶ www.competition-commission.org.uk/assets/competitioncommission/docs/2012/aggregates-cement-and-ready-mix-concrete/market_definition_housestyle.pdf.

Views of the parties

36. The planning permission process and the timescale required to obtain planning permission for primary aggregates sites were mentioned by all the Majors as potential barriers to developing new sites for aggregate production.
37. The key steps in the process for obtaining planning permission for a new site are:
- (a) Allocation of the site in the minerals development plan of the relevant Minerals Planning Authority (the relevant local authority). The site may be one of several being put forward and the process of allocation may include a public inquiry. The local plan is guided by the Managed Aggregates Supply System (MASS) process that includes national and regional demand forecasting and guidelines for site allocation to meet the forecast demand.
 - (b) Preparation of an Environmental Impact Assessment.
 - (c) Preparation of the planning application.
 - (d) Consultation with various statutory bodies regarding the permits and licences that will be required.
 - (e) Public engagement.
 - (f) Refining and submission of the planning application.
 - (g) Following the granting of planning permission, additional applications must be made for environmental permits to the Environment Agency and for other licences to organizations which could include local authorities, English Nature, English Heritage and the Highways Agency.
38. We received a range of estimates for the length of the planning process for new primary aggregates sites:
- Cemex told us that promotion of a site to the relevant minerals development plan could take three to ten years, and obtaining planning permission could take between one and five years.

- Hanson estimated that, based on the assumption that a site is a greenfield sand and gravel operation of ten years' life, with no current market presence and no ownership of any potential site, consulting with the local authority and securing allocation of the site in the minerals development plan could take two to five years, preparing and submitting the environmental impact assessment and planning application a further one to two years, and the outcome of the planning application a further six to twelve months. Hanson also noted that the MASS was designed to facilitate planning applications and that the MASS assisted mineral planning authorities and operators by providing indicators as to when planning permissions would require to be released for new reserves; the planning system was not always a significant barrier to entry; and that a significant number of planning applications were granted. (See paragraphs 40 and 41.)
- Lafarge estimated that the environmental impact assessment and preparation of the planning application could take 18 to 24 months and that the planning application process could take one to three years. Lafarge noted that the timescale estimates were dependent on the scale and nature of the mineral deposit, the anticipated volume to be quarried and the management of the planning process by the prospective operator. Lafarge also noted that if the application were refused, a subsequent appeal, possible public inquiry and resubmission could take a further three years.
- Tarmac estimated that discussions with the planning authority on the viability of the site and allocation of the site into the local mineral plan would take one to four years; the preparation of the planning application and the environmental, traffic and archaeological impact assessments could take up to 18 months; and the review by the planning authority and consultation with other statutory and non-statutory bodies could take two to three years.
- Aggregate Industries estimated that once a planning application was submitted, it would take around 12 months to determine. It told us that obtaining planning

permission was not an insurmountable barrier to entry and commented that the National Planning Policy Framework published in March 2012, which set out the Government's planning policies for England and how they were expected to be applied by local authorities, had maintained and clarified previous policy for minerals and was intended to make obtaining planning permission more straightforward.

- The MPA said that it could take between 5 and 15 years for a new quarry (or extension) to become operational after going through the various stages of planning and pre-planning, including surveying, site investigation and resource analysis, identifying sites, securing control/ownership of the site/mineral and completing the planning process including an environmental impact assessment.
- Sibelco, a producer of high-purity silica for use in ceramics and glass manufacture, told us that it was not subject to the MASS process because it did not extract construction aggregates. It said that obtaining planning permission for a new site was very difficult and estimated that it would take ten years from identifying a suitable site before it would be operational. It said that it did not currently envisage that it would seek to develop a new site. It noted that some of the minerals it produced had defence applications and that it might be able to use compulsory purchase orders to gain access to the minerals. However, the Government's guidance notes on the general principles of the planning system stated that issues of national security might be taken into account in planning decisions but each case would be considered on its merits.⁷

39. The impact of landbank policy on the planning permission process is discussed in our working paper on policy and regulation and our working paper on the competition aspects of policy and regulation (both to be published in due course). The Government's key principles and policies for national minerals planning are set out in

⁷ www.communities.gov.uk/documents/planningandbuilding/pdf/147396.pdf.

Minerals Planning Statement 1, which recommends that a landbank of permitted reserves is maintained in each area sufficient to meet forecast demand for at least seven years in the case of sand and gravel and at least ten years in the case of crushed rock. The MPA said that there were concerns that some local Minerals Planning Authorities had interpreted the landbank recommendations too rigidly, with the effect that there was only a narrow window for new reserves being permitted and that planning applications might be refused if the landbank in an area extended beyond the minimum durations specified in the Government's statement, even if only by a small margin. The BAA told us that if the landbank was sufficient to meet the forecast demand for the specified periods, it was almost impossible to obtain planning permission.

40. The MPA noted that most planning applications for new primary aggregates sites were successful: the annual surveys of its members between 2000 and 2008 found that in England, Scotland and Wales there were 51 planning applications for new sand and gravel sites, of which 41 (78 per cent) were successful, and three planning applications for new crushed rock sites, all of which were successful. The MPA did not report on the reasons why planning applications were refused.
41. The MPA further reported that 44 of the planning applications were made by large companies (which it defined as having over 1,000 employees), ten of which were refused and ten were made by small and medium-sized enterprises, all of which were successful.
42. The BAA told us that it thought the Localism Act, which was passed in November 2011, would make it more difficult to obtain planning permission for new quarries, and therefore in the future there would be almost no new entrants in aggregates production.

43. We received evidence that the planning process is likely to be less onerous in relation to borrow pits. A borrow pit is a temporary quarry, usually developed by a contractor, on the same site as a construction project, such as a road, in order to extract aggregates that will be used in the project. The use of a borrow pit depends on there being suitable aggregate resources available at the site. A borrow pit is restored once the project is completed. The planning permission for a borrow pit would usually be obtained in conjunction with that for the construction project itself.

Preliminary conclusions

44. Our preliminary view, notwithstanding that historically most planning applications were successful, is that the length of the planning process limits the competition faced over the medium term by existing aggregates producers from entry by operators developing new sites. The length of the planning process for new sites also creates an incumbency advantage for existing aggregate producers as the planning process for site extensions is generally much simpler (as noted in paragraph 58).

Capital cost

45. Four of the majors told us that the capital cost of developing a primary aggregates site was a potential barrier to entry, though three of the majors noted that the up-front costs could be minimized by leasing land and equipment. According to Hanson, the major cost items in establishing a greenfield site were:
- (a) acquiring land and mineral rights—high up-front capital cost could be avoided if the land was leased and the minerals paid for on a royalty basis;⁸
 - (b) land preparation and related costs (eg developing access) and land restoration at the end of the life of the operation—these costs varied significantly by operation;
- and

⁸ When aggregates are produced from a leased property, the owner is usually paid a share of the production income. This money is known as a royalty payment. The amount of the royalty payment is specified in the lease agreement and is usually a fixed amount per ton of aggregates produced or a percentage of the production value.

(c) equipment costs—equipment would include earth-moving equipment and processing plant (eg crushing and screening equipment). Costs might be reduced by leasing equipment or by using mobile plant which was generally cheaper. The use of mobile plant generally meant lower sunk cost as the equipment could be moved between sites.

46. The Majors estimated that the costs of the plant and equipment required to establish a primary aggregates site were as follows:

- crushed rock, small site: £1.8–£10.4 million;
- crushed rock, large site: £5.0–£42 million;
- sand and gravel, small site: £0.25–£4.0 million; and
- sand and gravel, large site: £1.4–£30.0 million.

These costs do not include the cost of leasing or acquiring land and mineral rights or planning. The cost estimates given by individual parties, together with their definitions of ‘small’, ‘medium’ and ‘large’ sites, are shown in [Appendix A](#).

An independent large aggregates producer ([X]) estimated that the cost of the plant for a small crushed rock site would be between £0.5 million and £2.5 million, and for a large crushed rock site it would be between £9.5 million and £20.0 million.

Preliminary conclusion

47. Our initial view is that there can be a considerable cost in developing an aggregates site, but the cost need not be prohibitive, particularly for small-scale sites, if the land and mineral rights are leased and the equipment is leased or rented.

Economies of scale

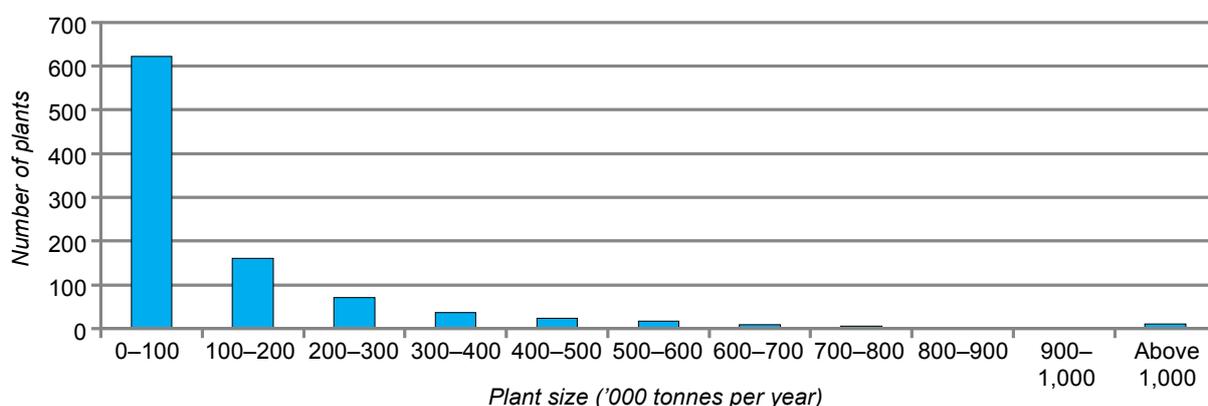
48. The Majors told us that some economies of scale existed in relation to primary aggregates, as larger sites could be operated more efficiently than smaller sites in terms of

unit costs because for larger sites, fixed costs were spread over a greater volume of sales.

49. However, Aggregate Industries told us that [REDACTED]. It also said that the fact that quarries of all sizes competed in the same local areas indicated that economies of scale were not an important factor. Figure 3 shows the distribution of UK primary aggregate sites by annual production volume and indicates that while some sites produce more than 1 million tonnes of primary aggregates per year, 65 per cent of sites produce less than 100,000 tonnes per year.

FIGURE 3

Production of primary aggregates sites in the UK



Source: CC analysis.

50. Cemex also noted that the economies of scale of a larger plant would not be achieved if there was insufficient demand for the plant to be operated at capacity, and said in addition that the existence of a large number of small aggregates producers demonstrated that economies of scale were not an important barrier to entry. Lafarge commented that the optimum size for a plant depended on the demand within an economically serviceable area and Tarmac noted that a larger plant was not necessarily an advantage given the local nature of the market for aggregates.

51. [REDACTED]

52. Cemex, Lafarge and Tarmac noted that some economies of scale arose through operating multiple sites as central support costs were spread across a larger volume of output. Aggregate Industries and Cemex noted that there could be some logistics savings as production and haulage could be matched more efficiently. On the other hand, Tarmac said that, in its view, owning multiple aggregates sites was not important in the production and sale of aggregates because the markets were local.
53. Aggregate Industries, Lafarge and Cemex added that being part of a larger group was a benefit in terms of access to expertise, particularly in relation to product development.

Barriers to expansion

54. The Majors told us that there were very limited barriers to increasing production at an existing operational primary aggregates site within its existing plant capacity. Tarmac noted that this applied when prevailing levels of capacity utilization were low. Cemex noted that fixed costs were unlikely to increase and that the cost of any additional labour required would not be prohibitive. Aggregate Industries and Hanson noted that planning permission might be required to amend the hours of operation or vehicle movements, and Hanson added that the availability of train paths for large rail-linked units and the requirement to achieve product balance with either the demand for, or stocking space for, by-product could also act as potential limits on increasing production.
55. The Majors also told us that there were limited barriers to increasing the capacity of an existing plant. Lafarge noted that in the case of crushed rock, production capacity could be increased easily with mobile crushing and screening equipment, while for sand and gravel operations it was more usual to replace or enhance the existing processing plant. Lafarge also noted that there was substantial excess capacity within

the aggregates industry, such that output could be expanded at existing capacity levels. Aggregate Industries and Hanson also noted that planning consent might be required to expand the capacity of an existing site. Hanson commented that the planning consent process was much less onerous and the timescale much shorter for a capacity extension at an existing site than for a new greenfield development.

56. The MPA noted that most planning applications for the expansion of aggregates sites were successful: the annual surveys of its members between 2000 and 2008 found that in England, Scotland and Wales there were 186 planning applications to extend new sand and gravel sites, of which 165 (89 per cent) were successful, and 74 planning applications to extend crushed rock sites, of which 67 (91 per cent) were successful. The MPA did not report on the reasons for which planning applications were refused.

57. The MPA further reported that 194 of the planning applications were made by large companies (which it defined as those having over 1,000 employees) and 66 were made by small and medium-sized enterprises, and that the large companies and SMEs had similar success rates in obtaining planning permission.

Preliminary conclusion

58. Our initial view is that expanding an existing site, either by increasing its output or by extending the site, is likely to be easier, faster and cheaper than developing a new site because the planning process is likely to be simpler, and much of the required equipment will already be in place and therefore existing producers have an incumbency advantage over new entrants.

Marine aggregates

59. According to the BMAPA, the share of marine aggregates in the Great Britain aggregates market was 4.8 per cent in 2010.⁹
60. We considered the following possible barriers to marine aggregates production:
- (a) availability of resources;
 - (b) licensing;
 - (c) access to facilities; and
 - (d) capital cost.

Availability of resources

61. Marine sand and gravel extraction can only take place where suitable resources exist. Seabed sand and gravels are widespread around Great Britain, but many deposits are in deep water or are too thin to be commercially dredged or are dominated by unsuitable grain sizes (eg fine sand) and therefore not suitable for construction aggregate use.¹⁰ The industry believes that the commercially viable resources of marine sand and gravel are sufficient to last for at least 50 years at the current rates of extraction.¹¹ The volume and location of the marine aggregates that can be extracted by dredging are dependent on the licensing regime. The area of the UK seabed that was licensed for dredging in 2011 was 1,274 km², which represents 0.15 per cent of the total UK seabed; the area actually dredged was 114 km², which was 8.9 per cent of the area licensed.¹²

Licensing

62. The commercial rights to marine sand and gravel resources in the waters around the UK are held by The Crown Estate which owns the seabed out to 12 nautical miles

⁹ www.bmapa.org/about/key_facts.php.

¹⁰ The practical limit in dredging is 50 metres.

¹¹ British Geological Survey: *The strategic importance of the marine aggregates industry in the UK*.

¹² *The area involved—14th annual report*, published by the BMAPA and the Crown Estate, August 2012.

and retains the rights to the non-energy mineral resources out to 200 nautical miles as part of the hereditary possessions of the Sovereign. The Crown Estate is responsible for issuing (a) prospecting agreements, which are granted to operators through a commercial tendering process and are required in order to undertake the necessary surveys to determine the viability of an area, and (b) production agreements. A production agreement will only be issued if the operator has undertaken a satisfactory environmental impact assessment and obtained a Marine Licence from the regulator for marine minerals extraction, the Marine Management Organisation.¹³ Hanson told us that historically it took between seven and ten years to obtain a production licence, but the process had been simplified and now should not take more than five years, and also that an operator could shorten this period by entering into a commercial arrangement to use another party's licence, subject to the approval of The Crown Estate. [REDACTED]

Access to facilities

63. According to the BMAPA (based on information on The Crown Estate website), there are over 60 wharves in 35 ports around England and Wales where marine aggregates are currently unloaded. Hanson told us that access to wharf facilities did not present a barrier to entry. Further, Hanson said that, depending on the material being dredged, there might be limited or no need for processing as clean sand could be landed and left to dry at the wharf before collection whilst mixed cargos of sand and gravel needed grading and washing in plants similar to those used for processing land-won sand and gravel.

Capital cost

64. Hanson estimated the cost of entry into marine aggregates production, excluding the cost of a dredger, to be between £[REDACTED] million and £[REDACTED] million for a small-scale oper-

¹³ www.bmapa.org/regulation_and_management/licensing_and_regulation.php.

ation (less than [x] tonnes per year) and between £[x] million and £[x] million for a large-scale operation (more than [x] tonnes per year). It estimated the cost of a dredger to be between £[x] million and £[x] million to support a small-scale operation and between £[x] million and £[x] million to support a large-scale operation.

65. Cemex estimated that the cost of entry into marine aggregates production would be up to £[x] million for a small-scale operation (less than 200,000 tonnes per year) and between £[x] million and £[x] million for a large-scale operation (more than 1 million tonnes per year).
66. Entry at the upper end of these production scales would represent a significant proportion of the UK marine aggregates industry, which landed a total of 11.5 million tonnes of aggregates in the UK in 2011.

Preliminary conclusions

67. Our initial view is that licensing and capital outlay considerations in relation to the production of marine aggregates create barriers to entry in the aggregates market via this route similar in scale to those created by the planning process and capital requirements to enter via the production of land-based primary aggregates.

Secondary and recycled aggregates

68. The MPA noted that the share of secondary and recycled aggregates in the Great Britain aggregates market had increased from 10 per cent in 1990 to 28 per cent in 2011. The MPA also noted that there were a large number of independent suppliers of construction and demolition material.
69. The Majors told us that there were low barriers to entry into secondary aggregates production, although the availability of a steady supply of secondary material, which

could be (for example) slag from iron and steel manufacture or waste from slate and china clay quarrying, could limit the production of secondary aggregates. Cemex noted that little capital investment was required as crushing, grading and sorting equipment could be leased and brought on to the site and made operational very quickly. Hanson commented that secondary aggregate operations were considerably less intensive and planning represented a much lower hurdle than in the case of primary aggregates.

70. The Majors told us that there were low barriers to entry into recycled aggregates production, although the availability of materials to recycle could limit the production of recycled aggregates. Demolition and construction waste was the dominant source of such material and the availability would depend on the level of demolition and construction activity in an area. The BAA commented that 28 to 30 per cent represented the maximum proportion of total aggregates likely to be supplied by recycled aggregates because of the finite availability of material to recycle. The BAA also noted that recycled aggregates were not suitable for use in the production of higher-strength concrete when quality assurance was an important consideration as the concrete had to be made with a consistent grade of raw material from a known origin.

71. Capital costs are significantly lower than for primary aggregates as when the operation is co-located with a demolition site there is no additional land cost. The planning process is also simpler: Aggregate Industries noted that a contract to recycle materials from a demolition site could be [~~£~~] and that recycled aggregates operations were not classified as mineral operations for planning consent purposes.

Preliminary conclusions

72. Our initial view is that there are lower barriers to entry for recycled aggregates than for primary aggregates, although the limit on the availability of material to recycle will constrain entry via this route and, for the reasons set out in the market definition working paper¹⁴, recycled aggregates are not fully substitutable for primary aggregates across the full range of end-uses.
73. We noted that secondary aggregates are, by definition, the by-products of other, often significant, industrial processes. Given the landfill tax and the revenue able to be realized through the sale of secondary aggregates, there are likely to be strong incentives on producers of material that can be sold as secondary aggregates to sell it as such, rather than simply to dispose of it. However, the amount of secondary aggregates produced is unlikely to vary in response to variations in the competitive conditions for primary aggregates: rather, the amount produced is likely to depend mainly on the production of the primary products from which they are derived (or if technological advances make secondary aggregates production or processing more commercially viable). Therefore the concept of 'new entry' or 'expansion' into secondary aggregates production did not seem particularly meaningful in the context of our inquiry.

Cement

Possible modes of entry and expansion

74. We identified the following possible modes of entry and expansion:
- (a) developing a new cement plant (or expanding an existing one);
 - (b) developing a grinding mill (or expanding an existing one); and
 - (c) establishing an import operation (or expanding an existing one).

¹⁴ www.competition-commission.org.uk/assets/competitioncommission/docs/2012/aggregates-cement-and-ready-mix-concrete/market_definition_housestyled.pdf.

Evidence of entry and exit

75. There are 11 cement production plants in the UK. The most recent commissioning of a cement plant in the UK was at Tarmac's Tunstead works in 2004 where the original wet-process plant was replaced by a dry-process plant with an annual capacity of 825,000 tonnes. Following investment of £[redacted] million in 2008, the annual capacity was increased to 1 million tonnes.
76. Hanson commented that, given the depressed state of demand and the availability of alternative methods of entry, entry via new cement production facilities appeared unlikely in the current climate.
77. In 2009, Cemex opened a cement grinding mill at Tilbury with an annual capacity of [redacted] million tonnes.¹⁵
78. Six new cement import terminals have been opened since 2007, as shown in Table 2. These facilities have the capacity to account for only a small proportion of annual UK cement consumption, which in 2010 was 9 million tonnes, comprising 7.8 million tonnes from domestic production and 1.2 million tonnes from imports.¹⁶

TABLE 2 **Cement import terminals opened in the UK since 2007**

<i>Location</i>	<i>Owner</i>	<i>Date opened</i>	<i>Estimated capacity (tonnes per year)</i>
Blythe	Sherburn Stone	2007	[redacted]
Southampton	Dudman Group	2007	[redacted]
Workington	Thomas Armstrong	2008	[redacted]
Lowestoft	Dudman Group	2010	[redacted]
Garston	Dudman Group	2011	[redacted]
[redacted]	[redacted]	2012	[redacted]

Source: Lafarge.

Note: N/A = not available.

79. Five cement works have been closed since 2007, as shown in Table 3.

¹⁵ www.cemex.co.uk/ac/ac_pr_20090922.asp.

¹⁶ http://cement.mineralproducts.org/documents/Cement_Industry_Key_Facts_and_Figures.pdf.

TABLE 3 **Cement works closed in the UK since 2007**

<i>Location</i>	<i>Owner</i>	<i>Date closed</i>	<i>Reason for closure</i>
Northfleet	Lafarge	2008	[REDACTED]
Ridham (import terminal)	Lafarge	2008	[REDACTED]
Barrington	Cemex	2008	[REDACTED]
Westbury	Lafarge	2009	[REDACTED]
Rochester	Cemex	2009	[REDACTED]

Source: Lafarge, Cemex.

Cement plant: barriers to entry and expansion

80. We considered the evidence relating to the following possible barriers to entering the cement market:

- (a) capital cost (paragraphs 81 to 83);
- (b) availability of raw materials (paragraphs 84 to 86);
- (c) lead time and planning permission (paragraphs 87 to 89);
- (d) emissions regulations (paragraphs 90 and 91);
- (e) economies of scale (paragraphs 92 to 95); and
- (f) barriers to expansion (paragraphs 96 to 99).

Capital cost

81. The Majors¹⁷ told us that the most significant barrier to entry was the capital cost of building a new cement plant. The cost estimates given by individual parties are shown in [Appendix A](#):

- Hanson estimated the cost to be between £[REDACTED] million and £[REDACTED] million for a small-scale plant ([REDACTED] tonnes) and between £[REDACTED] million and £[REDACTED] million for a large-scale plant ([REDACTED] tonnes).
- Tarmac estimated the cost to be between £150 million and £180 million for a small-scale plant (750,000 tonnes) and between £230 million and £285 million for a large-scale plant (1.5 million tonnes). The cost of the new plant at Tunstead,

¹⁷ References to the Majors in this section exclude Aggregate Industries, which said that it had no experience of cement production and therefore did not offer any evidence.

which replaced an old plant on the same site (and was therefore less expensive than new entry), was £[redacted] million.¹⁸ As noted in paragraph 75, the new plant was commissioned in 2004 with an annual capacity of 825,000 tonnes a year, and following further investment now has a capacity of 1 million tonnes a year.

- Lafarge estimated the cost to be between £250 million and £360 million for a plant with an annual capacity of 1 million tonnes.
- Cemex said that it could not estimate the cost of a new cement plant because it depended on too many different factors, but noted that the RMC Group (which was acquired by Cemex in 2005) had spent approximately £[redacted] million on the construction of its cement plant at Rugby, which opened in 2000 and has a capacity of [redacted] million tonnes.

82. Leiths (Scotland) Limited (Leiths), which produces aggregates and RMX in Scotland, but does not produce cement,¹⁹ estimated that the cost of establishing a cement plant would be in excess of £120 million and said that investments of that scale were feasible only for global players.

83. Breedon also said that the extremely high capital cost for cement production was a barrier to entry and that uncertainty over the future demand for cement made financing difficult.

Availability of raw material

84. Hanson told us that a significant barrier to entry was the need to develop a new limestone quarry, and the associated issues with obtaining planning permission for that quarry. Hanson explained that to justify the investment in a cement plant, sufficient limestone to support at least 25 years' cement production would be

¹⁸ During the [Anglo/Lafarge merger inquiry](#), Anglo American plc told the CC that the cost was around £[redacted] million and the production capacity of the plant was initially 0.8 million tonnes and that this was subsequently increased to 1 million tonnes a year in 2008.

¹⁹ Leiths sources its cement from [redacted] and [redacted].

required, which would amount to approximately 50 million tonnes, and that a quarry capable of producing 2 million tonnes a year represented a large-scale operation. Hanson also noted that while it did not consider limestone to be a scarce resource in the UK, limestone occurred primarily in areas that were designated as national parks or Areas of Outstanding Natural Beauty and that obtaining planning permission for a new quarry and cement plant in such areas would be very unlikely.

85. Breedon also noted that lack of availability of high-quality limestone reserves was a barrier to entry.

86. A report published by the British Geological Survey (BGS) notes that the highest-quality and most easily worked deposits of carboniferous limestone—the most important type of limestone for cement production—occur in the Peak District, the northern Pennines and the fringes of the Lake District.²⁰ The BGS also reports that 61 per cent of reserves of carboniferous limestone in the UK is in areas designated as National Parks, Areas of Outstanding Natural Beauty and Sites of Special Scientific Interest.

Lead time and planning process

87. Hanson told us that time frames were difficult to estimate because there were no recent examples of a (completely new (ie including mineral reserves)) cement plant being developed, but it would expect the following stages to be significantly time consuming:
 - (a) identification of limestone resources;
 - (b) land assembly, due to the significant land holding required to support limestone extraction for at least 25 years; and

²⁰ BGS factsheet on cement raw materials: www.bgs.ac.uk/mineralsuk/planning/mineralPlanningFactsheets.html.

(c) planning promotion, application and consent, which would be likely to be subject to objection.

Hanson estimated that the total lead time up to the point at which site works to install plant could commence would be 10 to 15 years. However, if a new cement plant could be based on an existing limestone reserve with suitable planning permission in place for mineral extraction (so that the land assembly and geological investigation phases were not relevant), Hanson said that the planning just for the cement plant might take three to five years.

88. Cemex estimated that site selection would take one year, planning and permissions two to three years, procurement and construction two to three years, and commissioning and start-up up to one year.

89. Lafarge estimated that the time from the start of a project and to the point at which construction could commence (including site search, land assembly, environmental assessment and the planning process) would be between 6 and 14 years. It estimated that cost of the planning process, excluding exploration and land and mineral acquisition, would be [REDACTED]. It also estimated that tendering and construction would take a further 3 to 3½ years. Lafarge noted that the timescales and costs depended on how a prospective developer managed the processes, for example more cost could be incurred earlier to save time by running some tasks in parallel. Lafarge told us that it had [REDACTED].

Emissions regulations

90. Lafarge told us that there were significant uncertainties regarding the future cost to be imposed on carbon emissions which affected the cost of new entry. The uncertainty relates particularly to the period after 2020 when, subject to carbon leakage considerations, the EU Emissions Trading System (ETS) will require all cement

producers to pay for each tonne of carbon emitted. Lafarge argued that if the 2014 review of industrial sectors classified as being vulnerable to carbon leakage resulted in cement not continuing to be classified in this way, cement producers would be required to purchase CO₂ rights, which would impose an extra cost and put them at a disadvantage compared with imports from outside the EU. Lafarge commented that these uncertainties weighed heavily against potential new cement plant projects.

91. Moreover, it may become more difficult for new entrants to obtain carbon allowances than existing producers. Under phase three of the EU ETS, which comes into effect on 1 January 2013, 5 per cent of all free carbon allowances will be set aside in a 'New Entrants Reserve' (NER) for new installations, including capacity extensions to existing plants, which commence operations after 30 June 2011. Once the NER is exhausted, new installations will be required to purchase any carbon allowances they require.

Economies of scale

92. The Majors told us that economies of scale existed as larger cement plants could be operated more efficiently than smaller plants in terms of unit costs as fixed costs were spread over a greater volume of sales. Lafarge told us that the economies of scale in cement production were illustrated by the increase in the average scale of integrated cement works and kiln capacity in the UK from 0.1 million tonnes of average kiln capacity in 1959, when some 130 kilns were in operation at 50 cement works, to 1.05 million tonnes of average kiln capacity in 2009, when 11 kilns were in operation at 11 cement works, as shown in Table 4.

TABLE 4 Great Britain grey cement works and effect on capacity

Year	Works	Kilns	Cement capacity (m tonnes)	Average kiln capacity (m tonnes)
1959	50	130	12.9	0.10
1970	40	117	19.5	0.17
2006	15	20	15.1	0.76
2009	11	11	11.5	1.05

Source: 'Forty years of cement manufacture 1966–2006', Dr Chris Clear, *Concrete*, July 2006; Lafarge estimates for 2009.

93. [X].

94. The Majors told us that some economies of scale arose through operating more than one site, as logistics costs could be reduced if production could be matched better geographically with demand. Cemex and Tarmac also told us that economies of scale arose through operating multiple sites, as central support costs were spread across a larger volume of output, and Tarmac added that procurement savings could be achieved by being a bulk purchaser. Lafarge told us that because it was more efficient to operate cement kilns on a continuous 24-hour basis owing to the high kiln start-up cost, having multiple sites allowed production to be scheduled efficiently across the plants. Lafarge also told us that having multiple sites made the use of rail to transfer cement between plants and depots effective, which reduced supply costs. It said that a train could transport up to approximately 1,750 tonnes in one shipment compared with approximately 30 tonnes by road tanker and the cost per tonne per kilometre (£/t/km) by rail therefore could be approximately three to four times lower on a £/t/km basis compared with road transport over long distances.

95. Cemex, Hanson and Lafarge added that being part of a larger group was a benefit in terms of access to technical expertise.

Barriers to expansion

96. Hanson and Tarmac told us that there were no significant barriers to a cement producer increasing production based on existing capacity when the current levels of capacity utilization is low. Hanson said that kilns could be run for longer, plants could operate additional shifts and mothballed capacity could be reinstated (which it estimated would cost between £[redacted] million and £[redacted] million, although Hanson also noted that the cost and availability of additional carbon allowances would have to be taken into account).

97. Table 5 shows cement capacity, production and utilization in 2011 for Lafarge, Hanson, Cemex and Tarmac.

TABLE 5 Cement capacity, production and utilization in 2011

	Capacity	Production	Utilization %	Excess capacity
Lafarge	[redacted]	[redacted]	[redacted]	[redacted]
Hanson	[redacted]	[redacted]	[redacted]	[redacted]
Cemex	[redacted]	[redacted]	[redacted]	[redacted]
Tarmac	[redacted]	[redacted]	[redacted]	[redacted]*

Source: Lafarge, Hanson, Cemex and Tarmac.

*Tarmac told us that throughout the 2007–2011 period it had effectively operated at capacity. It said that since cement production capability was introduced at Tunstead, it had been seeking to optimize efficiency, reliability and input mix, eg by using alternative fuels with lower CO₂ emissions, and had gradually increased its production to close to its achievable capacity over the years. It told us that therefore it did not have spare capacity over this period even though it had not been producing at nameplate capacity.

98. On the other hand, Cemex told us that, in its view, there was almost no scope for a cement producer to increase production based on existing capacity at a cement plant because once operational, a cement kiln must run continuously at 1,450°C and either at full capacity or not at all because it was not economically viable to run kilns at less than full capacity or on a stop-start basis. Cemex estimated that it would cost approximately £[redacted] million to reinstate the second kiln at its South Ferriby plant which is currently mothballed. Lafarge also noted that stopping and starting a cement kiln was very energy inefficient so it would always aim to maximize output.

99. The Majors told us that the capital investment required to expand a plant (for example, by way of an additional kiln or additional grinding capacity) was a significant barrier to increasing the capacity of an existing plant. Three of the Majors also commented that it would be necessary to secure regulatory permissions to operate an expanded plant. Hanson added that sufficient limestone reserves to service the additional capacity would have to be secured. Lafarge noted that increasing the capacity of an integrated cement plant typically involved debottlenecking the limiting step within the process, and the cost would depend on the nature of the new or improved equipment required to enable greater throughput through that part of the process. Lafarge also noted that, in the case of expanding clinker capacity, a potential barrier to expansion (as for entry via establishing a new cement plant, see paragraph 90) was uncertainty over the award of free carbon allowances under the EU ETS, without which the cost of producing clinker from the new capacity would be uncompetitive due to the need to purchase carbon allowances for 100 per cent of the additional production.

Preliminary conclusions

100. Our initial view, based on the evidence we have received, is that an investment of at least £120 million, and probably closer to £200 million, would be required to develop a cement plant. The smallest plant currently operational in the UK is [§] [500,000 - 1,000,000] tonnes, which represents approximately [§] [5 - 10] per cent of UK cement consumption.²¹ Given these factors, coupled with weak demand in the market and the ability of existing producers to expand output from plants which are currently not operating at full capacity, we consider it unlikely that new entry would be economically viable. In addition, we consider that the time required to identify and acquire a suitable site and to obtain planning permission would limit the competition

²¹ 2011 UK sales of cement were 8.402 million tonnes. Source: MPA factsheet on monthly cement sales: cement.mineralproducts.org/documents/Table_1_Monthly_Cement_2_Oct_12.pdf.

faced by existing producers from new entrants in the medium term, and that planning consent for a new quarry and cement plant will be difficult to obtain in the regions where limestone occurs most readily.

Cement grinding mill

101. An alternative model for entry into the production of cement is to build a grinding mill (where clinker from a cement kiln is ground to the fine powder that is cement) and source clinker from elsewhere.
102. Although a grinding mill can be developed at a lower cost than establishing an integrated cement plant, the capital investment is likely to be considerable. Cemex opened a grinding mill with an annual capacity of [redacted] tonnes at Tilbury in 2009 at a cost of £[redacted] million.²²
103. A potential constraint on establishing a grinding mill is securing a reliable supply of clinker. Cemex told us that its Tilbury mill [redacted], and commented that clinker was a globally traded commodity and could easily be imported from other sources.
104. Our initial view is that importing clinker would face a similar cost penalty to importing cement (see below). In addition, there are limited sources of clinker that are independent of the cement producers already present in the UK market (whether via UK production or via imports). Together with the capital cost of establishing a grinding mill, these factors would act as barriers to entry into the cement market by this route.

Cement imports

105. We considered the evidence relating to the following possible barriers to entering the UK cement market using imported cement:

²² www.cemex.co.uk/ac/ac_pr_20090922.asp.

- (a) access to an import terminal;
- (b) source of supply;
- (c) access to shipping;
- (d) capital cost;
- (e) incumbent reaction;
- (f) customer reaction;
- (g) vertical integration of the Majors; and
- (h) transport costs.

Access to an import terminal

106. The Majors told us that access to an import terminal could easily be secured. Cemex told us that there were numerous ports and wharves that were suitable for importing cement and that it was simple to convert existing storage facilities (such as grain silos) for cement. Lafarge also told us that there were many existing storage facilities at ports around the UK which could be used for cement imports and Hanson said that terminals did not require a great deal of sophistication and could be converted from other uses, and that wharves could be rented at modest cost.
107. Titan Cement UK (Titan) told us that there were only a limited number of ports suitable for import terminals, particularly for larger ships requiring deepwater facilities.
108. [REDACTED]
109. Sherburn Stone Ltd (Sherburn Stone), which started importing cement in 2007, told us that it had had no difficulty finding a port.

Source of supply

110. Cemex and Hanson told us that cement was readily available for import owing to international overcapacity, particularly from Spain and Ireland.
111. Titan told us that it thought securing a reliable source of supply might be more difficult for a new entrant than an established importer, and Sherburn Stone said that the main barrier to entry was securing a reliable source of supply.
112. Leiths told us that the major barrier to entry was the availability of competitively-priced cement.
113. [REDACTED]

Access to shipping

114. Hanson told us that shipping capacity was readily available.

Capital cost

115. Cemex told us that the cost of setting up a cement import terminal could be around £[REDACTED], while Lafarge estimated that the cost would be between £400,000 and £1 million. Cemex also suggested that the cost of setting up a terminal could be avoided by importing bagged cement on flatbed trucks.
116. Titan estimated that the capital cost of establishing a new deepwater terminal would be between £3 million and £5.8 million.
117. Sherburn Stone estimated that the cost of setting up an import terminal would be up to £[REDACTED] million [REDACTED] and £[REDACTED] million for other equipment.

Incumbent reaction

118. A mid-tier cement importer told us that the possible reaction by incumbent suppliers (which might include impugning the entrant's reputation and lowering prices) was a barrier to entry.

Customer reaction

119. Titan told us that it thought a new entrant might face reluctance from customers to change to a new supplier.

Vertical integration of Majors

120. Titan told us that the market available to independent cement producers/importers had reduced over the last 20 years because the major aggregates and cement producers had integrated vertically into RMX production and now supplied their own RMX plants with their own cement. This had made the market less attractive to new entrants because it reduced the size of the market addressable by independent cement producers/importers.
121. In 2011, approximately 50 per cent of all bulk cement purchased in the UK was purchased by the Majors (either from their own plants or the other Majors); the balance was purchased by non-Majors.

Transport costs

122. We consider transport costs in a working paper on cement imports to be published in due course.

Preliminary conclusions

123. Our preliminary view based on the evidence received is that the barriers to establishing a cement import operation will be more significant to smaller suppliers than to larger operators. As for clinker, cement will generally face a transport cost penalty

compared with UK-produced cement. In addition, finding a source of cement independent of the existing participants in the UK cement market would be likely to be difficult.

RMX

Evidence of entry and exit

124. Two of the Majors²³ provided data on the number of RMX sites that were opened and closed in the period 2007 to 2010. In both cases the information was based on reports prepared by BDS Marketing Research Ltd (BDS), and supplemented by Aggregate Industries with its own market intelligence.
125. Table 6 shows the total number of RMX sites that were opened and closed between 2007 and 2010, as provided by Aggregate Industries and Tarmac. The table also shows that the Majors accounted for a substantial proportion of the total sites opened and closed.

TABLE 6 **RMX sites opened and closed in the UK, 2007 to 2010**

	<i>Information provider</i>	
	<i>Aggregate Industries</i>	<i>Tarmac</i>
Total sites opened	[X]	133
Sites opened by the Majors	[X]	89
Total sites closed	[X]	204
Sites closed by the Majors	[X]	166

Source: Aggregate Industries, Tarmac.

126. Possible reasons for the inconsistencies between the information provided by Aggregate Industries and Tarmac are that the submissions do not distinguish between sites and plants, entries and expansions, closure and mothballing or entry and reopening.

²³ Some companies provided information covering 2006 and 2011; for consistency we have looked at 2007 to 2010. Cemex referred us to the BDS reports. Hanson provided information on the number of sites opened and closed based on the knowledge of its area sales managers of the areas in which Hanson is active. The figures provided by Lafarge were only for third parties and did not include Lafarge sites.

127. Tarmac also told us that, according to BDS, 23 new RMX suppliers commenced production between 2005 and 2009 and that the share of supply accounted for by local and regional suppliers (not including volumetric trucks) increased from 17 per cent in 2000 to 27 per cent in 2010. Tarmac noted that the largest number of exits from RMX was from the major players, which (along with the increase in market share of volumetric trucks) went to demonstrate that the independent and non-integrated suppliers had grown at the expense of the major national players.
128. The MPA noted that focusing on sites overlooked the importance of volumetric operators in the RMX market. These operators typically did not operate fixed plants but instead bought cement, aggregates and other materials which were mixed on volumetric trucks. The MPA referred to an estimate by BDS in May 2011 that there were at that time 200 operators of volumetric trucks/plant which accounted for 8.5 per cent of the RMX market.

Barriers to entry

129. The Majors told us that barriers to entry into the RMX market were low. We considered the evidence relating to the following possible barriers:
- (a) capital cost;
 - (b) availability of raw material;
 - (c) planning permission; and
 - (d) barriers to expansion.

Capital cost

130. The Majors told us that the capital investment required for RMX production was low:
- Lafarge told us that the cost of building an RMX plant could range from £0.3 million to £1.5 million for a large fixed installation, and that minimal upfront

- investment would be required in either land or trucks as they could be leased (or the transport could be subcontracted).
- Tarmac estimated the cost to be from £0.1 million for a second-hand plant to £1.5 million for a new large-scale installation, and also told us that no initial investment would be required in relation to transport as trucks could be leased or the delivery subcontracted.
 - Hanson said that the cost would be between £[redacted] million for a small-scale plant to £[redacted] million for a large-scale plant.

131. The Majors told us that entry into the RMX market using volumetric trucks required very little investment as the trucks could be purchased second-hand or leased.
132. Leiths told us that a mobile RMX plant and truckmixers would require investment of approximately £0.7 million. It said that a static plant in rural Scotland would cost approximately £1 million to establish, including truckmixers, while an urban plant would cost more, up to £2 million, owing to the site acquisition costs. Leiths also said that the cost of entry using volumetric trucks would be less than £250,000.
133. An operator of volumetric trucks told us that the initial capital cost of entering the RMX market with one volumetric truck was between £220,000 and £240,000. The operator said that the main cost items were the volumetric truck (£160,000), a cement silo (£30,000), a loading shovel for loading aggregates (£15,000 to £20,000) and tanks for water and diesel.

Availability of raw material

134. Cemex and Lafarge told us that aggregates and cement were readily available from suppliers in the UK and Europe and therefore they did not consider access to raw materials to be a barrier to entry. Hanson told us that it sold a significant proportion of

its cement production to independent RMX producers, which it considered to be an important segment of its customer base.²⁴

135. Leiths, on the other hand, told us that access to supplies of aggregates and competitively priced cement was a potential barrier to entry. Leiths also said that in some areas of Scotland it was difficult for Leiths to compete with the vertically integrated RMX/cement majors because they could control the price of the cement that went into their RMX. Leiths said that it had planning permission for a new RMX plant in south-east Edinburgh but the investment was not viable because the Majors ensured that concrete prices remained low.

Planning permission

136. Lafarge and Tarmac told us that any planning consents required could be obtained within three months of application and therefore they did not consider planning permission to be a barrier to entry.

Barriers to expansion

137. The Majors told us that increasing production at a plant based on its existing capacity would be straightforward when prevailing levels of capacity were low. Hanson noted that there might be planning limits on the maximum operating hours or vehicle movements at a site, but since most plants were currently operating below capacity, in practice any planning limits would not, in Hanson's view, constrain an increase in production. Lafarge said that almost all of its RMX plants had significant spare capacity and that there were no barriers to expanding production within the existing capacity. It also noted that variable costs constituted [REDACTED] per cent of total cost of sales in the RMX business, and therefore no significant increase in fixed costs would be incurred to increase production within existing capacity.

²⁴ In 2010 Hanson sold [REDACTED] per cent of its cement output to independent RMX producers.

138. The Majors also told us that there were no significant barriers to increasing capacity at an existing site. Aggregate Industries noted that planning permission might be required. Lafarge said that increasing capacity at a site would be likely to be achieved by replacing the plant with a higher-capacity model. Lafarge noted that a revision to the site's planning consent would probably be required but this would not be costly or difficult. Lafarge also noted that its RMX plants typically operated at [X] per cent capacity and therefore production capacity was unlikely to be a barrier to increasing output. Hanson noted that potential limits on increasing plant capacity might include the requirement for some capital investment in new plant or plant modifications and planning constraints, but the extent to which these factors constituted actual barriers would depend on site-specific circumstances.

Preliminary conclusions

139. Our preliminary conclusion is that barriers to entry in the RMX market are low given the low capital investment required, lack of economies of scale and low regulatory barriers. The use of volumetric trucks enables entry at a small scale with a limited investment. In our view, the structure of the market, with fully integrated Major players who dominate cement production in the UK and some regional players vertically integrated between aggregates and RMX, increases the risk and uncertainty over the supply of key inputs (cement and aggregates) for new entrants into the RMX market. This market structure might therefore act to deter new entry, particularly in regions where the extent of vertical integration is greatest.

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Cost of entry

Crushed rock

£ million

	<i>Plant scale: small/medium/large ktpa</i>	<i>Small scale</i>	<i>Medium scale</i>	<i>Large scale</i>
Aggregate Industries	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]
Lafarge	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]

Sand and gravel

£ million

	<i>Plant scale: small/medium/large ktpa</i>	<i>Small scale</i>	<i>Medium scale</i>	<i>Large scale</i>
Aggregate Industries	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]
Lafarge	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]

RMX

£ million

	<i>Plant scale: small/medium/large</i>	<i>Small scale</i>	<i>Medium scale</i>	<i>Large scale</i>
Aggregate Industries	[X]	[X]	[X]	[X]
Cemex	[X]	[X]	[X]	[X]
Hanson	[X]	[X]	[X]	[X]
Lafarge	[X]	[X]	[X]	[X]
Tarmac	[X]	[X]	[X]	[X]

Cement

£ million

	<i>Plant scale: small/medium/large ktpa</i>	<i>Small scale</i>	<i>Medium scale</i>	<i>Large scale</i>
Aggregate Industries		N/A	N/A	N/A
Cemex		N/A	N/A	N/A
Hanson	[X]	[X]	[X]	[X]
Lafarge			[X]	[X]
Tarmac	[X]	[X]	[X]	[X]

Note: N/A = not available