Silica (industrial) sands contain a high proportion of silica (normally more than 95% SiO₂) and are used for applications other than as construction aggregates. They are produced from both loosely consolidated sand deposits and by crushing weakly cemented sandstones. Unlike construction sands, which are used for their physical properties alone, silica sands are valued for a combination of chemical and physical properties. These include a high silica content in the form of quartz and, more importantly, very low levels of deleterious impurities, particularly clay, iron oxides and refractory minerals, such as chromite. They typically have a narrow grain-size distribution (generally in the range 0.5 to 0.1 mm). For most applications, silica sands have to conform to very closely defined specifications, and consistency in quality is of critical importance. Particular uses often require different combinations of properties. Consequently, different grades of silica sand are usually not interchangeable in use. Silica sands command higher prices than construction sands. This allows them to serve a wider geographical market, including exports.

Markets

Silica sands are essential raw materials for glassmaking and a wide range of other industrial and horticultural applications (Figure 1). Historically an important market for silica sand was in foundry casting. However, the progressive decline in UK heavy manufacturing, and notably the foundry industry, resulted in a steady reduction in the demand for foundry sand (Figure 2). This decline appears to have stabilised and there is a requirement for foundry sand to be of higher quality due to the typical applications now being served by UK foundries, (such as aerospace, military and precision automotive parts). There has been a recent increase in demand for glass sand. In 2007 glass sand accounted for 39% of total sales of silica sand, foundry sand 11%, sand for other industrial uses 24% and sand for horticultural and leisure uses 26%.

In the foundry industry, silica sand is used as the main mould and coremaking material for both ferrous and non-ferrous castings. The physical and chemical properties of the sand are important and depend on a number of factors, such as the metal and product being cast and the type of binder used. In the past, naturally-bonded moulding sands were widely used. These contained sufficient clay to give the mould strength without the addition of a bonding agent. Today such sands are of less economic importance and demand is principally for clay-free (washed) sands, which are high in silica. They should also have a uniform (narrow) size distribution, and grains with a generally high sphericity. A binding agent, either clay (usually bentonite) or a chemical, such as resin, is added to the sand.

There are many different types of glass with different chemical and physical properties. Most of the commercial glasses in everyday use, such as bottles and jars (containers), and flat glass (windows, mirrors and vehicle glazing), are soda-lime-silica glasses. These contain between 70–74% silica (SiO₂), the ultimate source of which is silica sand, although increasing amounts of silica are being recovered in the form of recycled glass (known as cullet). The manufacture of glass also requires a number of
other industrial minerals including limestone, dolomite, feldspar and salt.

The principal glass products using silica sand include colourless and coloured containers (bottles and jars), flat glass, light bulbs and fluorescent tubes, TV and computer screens, and glass fibre, both for insulation and reinforcement. Glass manufacturers are principally concerned with the chemical composition of silica sands, and particularly iron, chromite, and other refractory mineral contents. Quality requirements depend on the type of glass being manufactured (principally whether it is colourless or coloured) and to some extent on the requirements of the individual glass manufacturer. Glass sand for colourless glass containers generally has an iron content of <0.035% Fe₂O₃, (ferric iron oxide), for flat glass in the range 0.040 to 0.1% Fe₂O₃, and for coloured containers 0.25%–0.3% Fe₂O₃. However, it is the overall composition of the glass batch that is important and lower levels of iron in one component may be offset by higher levels in another. For example, the generally lower quality (i.e. higher iron) of colourless glass cullet has to be balanced by lower iron contents in the colourless glass sand.

Low iron silica sands, some of which are calcined (heat treated) to convert the quartz to cristobalite (a high temperature form of silica), are also ingredients of clay-based whiteware ceramic bodies, such as tableware, sanitaryware, and wall and floor tiles. They are also a component of ceramic glazes and enamels. Silica sand is the starting point for the manufacture of water-soluble sodium silicates, and other downstream silicon chemicals, such as silica gels, silicones, silanes and zeolites, which have a wide range of applications. In addition to a low iron content, a sand with a very low alumina content is also required for sodium silicates manufacture.

Other uses of silica sands include enhancing the production (as proppants) of oilfield reservoirs, in the production of silica flour for use as fillers in plastics, paints and rubber sealants, and as fluidised bed boiler sands. Closely-sized grades of silica sand are the principal filtration medium used by the water industry to extract solids from water. In contrast to other grades of silica sand, the particle sizes required are coarser, with 0.5 to 1.0 mm being a popular grading. An increasingly important market for silica sand is sports and leisure applications. Closely graded silica sand, in many cases mixed with organic matter, is used in top dressings and root zones for sports surface construction, for example for football and hockey pitches, and golf course tees and greens. Other uses of silica sand are for equestrian surfaces, for golf course bunkers, synthetic soccer pitches, as play sands and in horticultural applications demanding quality as well as consistency.

Supply

In comparison to the production of construction sand (about 42 Mt in the UK in 2007) silica sand output is relatively small (about 5Mt in the UK in 2007). Peak production of silica sand in Great Britain was some 6.3 million tonnes in the mid-1970s, but following a decline in the early 1980s production steadied to between 4 and 5 Mt/y for a number of years (Figure 2). Of total output in 2007, just under 90% was produced in England, with most of the remain-
Silica sand

Although Scotland is predominantly known to the wider public as a source of granite, it also produces one of the most versatile of materials—silica sand. Having extensive deposits of quartz-rich sandstones, Scotland is particularly well placed to supply one of the most important industrial resources. However, with significant identified resources, Scotland may become of increasing importance as a source of silica sand for UK industry in the future. Output reflects activity in many different sectors of the economy. There has been a marked decrease in the production of foundry sand (Figure 2). This is due to a decline in the total quantity of metals being cast, as the manufacturing sector of the UK economy has declined. Production of glass sand mainly reflects production of glass containers and flat (float) glass. Other sectors, such as special and technical glasses, including TV screens, lighting, domestic, laboratory and cosmetic glassware, and fibreglass both for insulation and reinforcement, are also significant consumers of sand. Over the last decade, overall glass sand production has increased mainly in response to the commissioning of two new float glass plants in Yorkshire in 2003.

A survey of silica sand production in England in 2007 by more detailed end uses was conducted by the Silica and Moulding Sands Association (SAMSA) for BGS (Table 1). The Survey, and the table below, only covers SAMSA Members although these account for most of the silica sand produced in England.

<table>
<thead>
<tr>
<th>Glass sand (a)</th>
<th>Tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat glass</td>
<td>683 386</td>
</tr>
<tr>
<td>Colourless containers</td>
<td>582 391</td>
</tr>
<tr>
<td>Coloured containers</td>
<td>190 618</td>
</tr>
<tr>
<td>Total glass sand</td>
<td>1 456 395</td>
</tr>
<tr>
<td>Foundry sand (b)</td>
<td>400 5443</td>
</tr>
<tr>
<td>Other industrial uses (c)</td>
<td>942 732</td>
</tr>
<tr>
<td>Sand for agricultural, horticultural and leisure uses</td>
<td>324 828</td>
</tr>
<tr>
<td>Total production</td>
<td>3 124 499</td>
</tr>
</tbody>
</table>

**Table 1** England: Production of silica sand, 2007.

(a) Excluding fibreglass
(b) Silica, resin-coated and naturally bonded
(c) Silica flour and cristobalite, sodium silicates/chemicals, fibreglass, ceramics, water filtration and other prescribed industrial processes set out in the Aggregates Levy.

Note: Table covers only SAMSA members. *Source: Silica and Moulding Sands Association.*

Significant quantities of sand for colourless glass manufacture are also produced in Scotland.

**Consumption**

The UK is essentially self-sufficient in silica sand with a total consumption of about 5 million tonnes. Imports are mainly into Northern Ireland and exports are principally from Scotland. Small quantities of water filtration sands and resin-coated foundry sands are also exported.
Trade

International trade in silica sand is relatively small. Data for UK imports and exports are shown in Table 2.

<table>
<thead>
<tr>
<th>Imports</th>
<th>Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonnes</td>
<td>£thousand</td>
</tr>
<tr>
<td>2001</td>
<td>46 500</td>
</tr>
<tr>
<td>2002</td>
<td>104 232</td>
</tr>
<tr>
<td>2003</td>
<td>78 944</td>
</tr>
<tr>
<td>2004</td>
<td>79 808</td>
</tr>
<tr>
<td>2005</td>
<td>127 922</td>
</tr>
<tr>
<td>2006</td>
<td>190 813</td>
</tr>
</tbody>
</table>

Table 2 UK imports and exports of silica sand, 2001–2006. Source: HM Revenue & Customs.

Value

The value of UK silica sand sales was estimated at £67 million in 2007 (ONS 2008). The official figure for employment in the silica sand industry in Great Britain in 2004 was 463. However, this figure only includes employees that are subject to the Mines and Quarries Acts. The numbers employed by the industry as a whole, including other permanent employees at quarry sites and head office staff, is likely to be significantly greater.

The glass industry is the most important consumer of silica sand, although the mineral is consumed in many other sectors of the economy. In 2007 the UK produced about 2.1 million tonnes of container glass valued at £524 million, most of which was sold in the home market.

The production of flat glass in 2007 was around 1.1 million tonnes with a value of about £210 million. In 2007 there were about 2800 people directly employed in the container glass sector and 1500 in flat glass. More are employed in the downstream processing of flat glass.

The special glass industry is the most diverse in terms of production process and capacities. This sector encompasses products such as lighting, television tubes, oven hobs and specialist optical, medical and scientific products. Production from this sector was estimated at around 250 000 tonnes in 2007, with a sales value of £117 million. Production from the glass fibre sector was estimated around 350 000 tonnes in 2007 with a sales value £380 million. Continuous glass fibre has many applications including reinforcement of plastics, rubber and wall coverings, however, it is chiefly used as an insulation material.

Structure of the industry

There are a number of silica sand producers in the UK. The largest is Sibelco UK Ltd, which accounts for over 50% of total production and an even greater proportion of colourless glass sand. The company is a wholly-owned subsidiary of SCR Sibelco, a privately owned Belgian group with silica sand interests worldwide. Sibelco UK has silica sand operations in Cheshire, Staffordshire, Surrey, Norfolk, North Lincolnshire, and Bedfordshire in England and West Lothian in Scotland.

Other important producers in England are:

- Hanson Aggregates, Surrey and Kent
- Tarmac Group, Cheshire
- Bathgate Silica Sands Ltd, Cheshire
- Garside Sands – Bardon Aggregates, Bedfordshire, Dorset
- Cemex UK Materials, Kent
- Mansfield Sands Ltd, Nottinghamshire
- Burythorpe Sands Ltd, North Yorkshire
- Bucbricks Arleigh Sands – Bardon Aggregates, Essex
- J Williams (Cinetic Sands) Ltd, Worcestershire

The main silica sand producers in Scotland are:

- Sibelco UK, Levenseat Quarry, West Lothian
- Fife Silica Sands Ltd, Burrowine Quarry, Fife
- O-I Devilla Forest Quarry, Fife
- Hugh King Ltd, Hullerhil Quarry, North Ayrshire
A number of other companies supply small amounts of silica sand.

The Silica and Moulding Sands Association (SAMSA), part of the Mineral Products Association, is the trade association for the silica sand industry.

The glass container industry is mainly located in Yorkshire and central Scotland and the flat glass industry is located in St Helens and South Yorkshire/North Lincolnshire. With the exception of the O-I operation at Devilla Forest in Fife, glass manufacturers are not involved in the production of glass sand in the UK.

Foundries are widely distributed but with a marked concentration in the West Midlands, Yorkshire and the East Midlands.

Resources

Silica sands are produced from loosely consolidated sands and weakly cemented sandstones ranging from Recent to Carboniferous in age. Although sand and sandstone deposits are widely distributed in the UK, only a small proportion of these possess the desired physical and chemical properties to be considered as potential sources of silica sand. These, in turn, will differ appreciably in purity, particle size and thickness. All of the sand resources will require some form of processing to upgrade them into marketable form. A critical factor, therefore, in defining a sand or sandstone deposit as a silica sand resource is its inherent particle size and the ease with which impurities can be removed, together with the level of losses incurred in this process. The special characteristics of the markets for silica sand and the costs of processing, means that silica sand resources have a fairly restricted distribution. In addition, resources that are suitable for one market may not be suitable for another. For example, sand suitable for the manufacture of colourless containers is only produced at six locations in the UK.

Silica sand resources of Pleistocene age in Cheshire and those of Lower Cretaceous age in eastern and southern England are the most important, with each accounting for nearly 40% of total output in England (Figure 3). In Scotland, production is based on Carboniferous sandstones in central Scotland. Production of high purity silica sand of Upper Cretaceous age from the mine at Lochaline on the west coast of Scotland ceased at the end of 2008.

The Congleton and Chelford sands in Cheshire are unusual for glacial deposits in having a uniform particle size and being largely free of impurities. Glacial deposits generally tend to be very heterogeneous in character and are not normally suitable for use as silica sand. The Cheshire deposits occur as irregular sheets, which infill troughs in the underlying clays and mudstones. They are themselves cut into by overlying boulder clay and impure sands only suitable for construction use. The Congleton Sand is highly valued as a source of foundry sand. The Chelford Sand is purer and coarser and is the most important source of sand for flat glass manufacture in the UK. Remaining resources of (white) Chelford Sand suitable for glass making are believed to be limited.

Silica sand is produced from deposits of Lower Cretaceous age at several locations in England. The Leziate Beds of Lower Cretaceous age, near King’s Lynn in Norfolk, are used in the manufacture of colourless glass containers, flat glass and for foundry sand. It is one of the very few deposits where there is no associated production of construction sand. In contrast the Folkestone Formation of the Lower Greensand Group of the Weald is a regionally important source of construction sand. However, between Buckland and Godstone in Surrey and Maidstone and Borough Green in Kent, there is also an important source of silica sand. The Surrey deposits in particular have low iron contents making them suitable for the production of colourless glass sand. These sands are also unusual in having a low alumina content (<0.1% Al₂O₃) making then suitable for the manufacture of sodium silicates.

The upper part of the Woburn Sands Formation of the Lower Greensand in the vicinity of Leighton Buzzard, Bedfordshire is a source of sand for foundry and horticultural applications, and water filtration. Coarse-grained, well-rounded quartz sands are particularly suited for water treatment and are produced by the
selective screening of sands from a number of quarries. Construction and silica sands are normally derived from the same quarry and their production is interdependent. Closely-sized water filtration sands are also produced from the Pleistocene Kesgrave Group of Essex, which is a regionally important resource of sand and gravel.

Sandstone within the Carboniferous Millstone Grit Group in Staffordshire is worked for silica sand principally at Oakamoor (Moneystone Quarry). Production from this site will cease in 2010 following refusal of a planning application to extend. A sandstone deposit of Carboniferous age was worked in the early 1990s at Blubberhouses, near Harrogate, North Yorkshire for the production of colourless glass sand. This operation is currently inactive and planning permission to extract sand from the site expires in 2011.

Sand for coloured glass containers is extracted from thin, wind-blown deposits of Recent age in the Messingham area of North Lincolnshire. Sands of Triassic age are worked in Nottinghamshire and Worcestershire and resin-coated sands are produced from sandstones of Jurassic age in North Yorkshire. Sands of the Tertiary age Poole Formation in Dorset are used in glass fibre manufacture.

Important and extensive silica sand resources occur in central Scotland. These are principally associated with medium to coarse-grained sandstones of the Passage Formation, which is Carboniferous in age. The Passage Formation comprises a cyclic sequence dominated by sandstones, which are white, grey and pale yellow in colour, but also includes mudstones, siltstones, seatearths and thin coals. The sandstones were deposited and then exposed to weathering in a humid tropical environment, which resulted in the decomposition of less stable minerals to produce softer, friable sandstones composed mainly of quartz. The main silica sand sites are now located on the eastern side of the Central Basin, with workings at Burrowine Moor and Devilla Forest in Fife, and Levenseat in West Lothian. The sands have a range of industrial and construction applications. The sandstones are also capable of being processed to produce sand with less than 0.035% Fe₂O₃ for colourless glass manufacture. The operations in Fife supply container glass manufacturers in Scotland and Yorkshire. The sandstone resources of the Passage Formation appear to be extensive and may become of increasing importance as a source of glass sand for the wider UK market in the future.

Small quantities of silica sand are produced from sandstones within the Carboniferous Upper Limestone Group at Hullerhill in North Ayrshire.

The highest purity silica sand in Britain occurs in the Cretaceous-age Lochaline White
Silica sand

Sandstone Formation in the Morvern peninsula and on the Isle of Mull on the west coast of Scotland. The underground mine which had worked this deposit since the 1940s was closed in December 2008.

There are limited resources of silica sand in Wales. Carboniferous sandstones on the northern flank of the South Wales Coalfield and in North Wales have relatively high silica contents and were worked for silica rock for refractory use in the past. However, they are hard, quartzitic sandstones from which sand would be difficult to produce. Locally the sandstones have weathered to produce unconsolidated sand deposits. One such deposit is worked for silica sand near Llanarmon in Denbighshire.

There are no significant silica sand resources in Northern Ireland.

Reserves

In mineral planning, the term ‘reserves’ or ‘mineral reserves’ refers to material that has a valid planning permission for mineral extraction. Without a valid planning permission no mineral working can legally take place.

A survey of permitted reserves of silica sand at members operational sites in England at 31st December 2007 was undertaken by SAMSA. The results are presented in Table 3.

Total permitted reserves of silica sand include a wide range of different qualities, many of which are not interchangeable in use. For example, the figure for colourless glass sand includes material suitable for both container glass and flat glass manufacture. However, the two uses have very different quality requirements, and a higher iron sand cannot be tolerated in container glass.

No systematic survey of permitted reserves of silica sand in Scotland has been undertaken.

Relationship to environmental designations

Two sites working the Folkestone Formation in Surrey and Kent respectively lie partly within AONBs. A number of other sites are in close proximity to AONBs. The inactive Blumberhouses Quarry lies within the Nidderdale Moors AONB.

A number of sites have adjacent nature-conservation designations some of these which been created by restoration of former silica sand. Examples include Messingham Quarry in North Lincolnshire (SSSI) and Wicken North in Norfolk (County Wildlife Site).

Extraction and processing

The extraction of silica sand is almost exclusively by surface quarrying, by both dry working and suction dredging. Hard sandstone deposits are, wherever possible, now worked by ripping rather than by drilling and blasting. Loosely consolidated sands can be easily removed. Worked thicknesses range from over 30 m for some glacial and sandstone deposits to less than 2 m for wind blown sands. Silica sand deposits lie beneath variable thicknesses of overburden.

<table>
<thead>
<tr>
<th>Permitted reserves</th>
<th>31 December 2007</th>
<th>Thousand tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colourless glass sand</td>
<td>12 347</td>
<td></td>
</tr>
<tr>
<td>Foundry and other silica sand</td>
<td>19 001</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>31 349</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 England: Permitted reserves of silica sand, 2007. Source: SAMSA

Silica sand processing is of varying degrees of complexity, and depends on the end use of the sand. It typically requires a high capital investment in plant. Processing is aimed at improving both the physical and chemical properties of the sand to meet user specifications. Typically several grades of sand are produced from one site either by selective extraction and/or processing. At most operations processing involves washing, attrition scrubbing and size-classification to remove the coarse and very fine fractions and to obtain a clean sand with the desired particle size distribution. Blending of lower and higher quality material is under-
taken to optimise the use of the reserves. For the production of colourless glass sand, more sophisticated processing is required to remove contaminating impurities, either from the sand and/or from the surfaces of the individual sand grains. Froth flotation and gravity separation using spiral classifiers are used to remove heavy iron-bearing minerals and chromite. Increasingly, however, high intensity wet magnetic separation is being used to remove iron-bearing impurities. Hot sulphuric acid leaching is used at King's Lynn in Norfolk, Oakamoor in Staffordshire and at Devilla Forest in Scotland, to remove iron oxides coating the individual sand grains. A cold acid leach is also used at Kings’ Lynn for the production of sand for flat glass. Froth flotation in an acid environment is used at Reigate in Surrey to remove heavy minerals, including iron coating the sand grains. Most foundry sands have to be supplied dried and drying facilities are a substantial capital investment.

Selected grades are also coated with resin binders producing a high value-added product. A wide range of grades are produced based on different particle sizes and resin types.

Some silica sand is calcined to convert quartz to cristobalite, which is a higher temperature form of silica more suitable for use in ceramics. Both cristobalite and dried silica sand are finely milled to produce various grades of silica flour. The extraction and processing of silica sand generally involves the production of only small amounts of waste. Yields of saleable product (including by-products — see below) are on average about 90%, excluding overburden removal, which is usually used in site restoration.

By-products

Silica sand deposits are very likely to contain sands with different physical and chemical properties with variations both laterally and vertically, sometimes over small distances.

Maximising extraction from any permitted site (while ensuring the restoration of an appropriate landform with long term afteruse provision) is likely to be the best environmental option. This may mean that defined areas of inferior quality are worked, processed and sold, usually as construction sand.

Of equal importance are co-products. These are derived when the mineral operator is required to process the raw sand to customer specification which results in the coarser and finer ends of the grain-size distribution being removed (this is particularly true for glass sands of all types). These coarse and fine fractions are sold if markets exist, possibly for an industrial end use. This is generally the most sustainable use of the reserve (subject to site restoration considerations).

Although the silica sand deposits being worked are, by definition, of uniform grain size and have low levels of colouring elements, it is unlikely that more than 65 to 70% of the raw feed will report to finished product for a glass sand.

Alternatives/Recycling

Recycled glass (cullet) from bottles is increasingly used to make new glass. The use of cullet has a number of environmental benefits. It not only reduces the demand for new silica sand (and other components of the glass batch) but, because cullet melts more readily, it saves energy and also reduces emissions. Moreover, glass can be recycled more or less indefinitely. However, it is important that glasses of different colours are not mixed and that, as with silica sand, the cullet is free from impurities, in particular metals and ceramics. In 2006, UK- manufactured glass containers contained an average 35.5% recycled glass. There is a surplus of green cullet, some of which is exported and some used as an aggregate in materials such as asphalt. However, even with increased glass recycling rates the industry is still very short of colour separated cullet, a situation which is likely to get worse if the trend by local authorities to collect mixed cullet grows. Recycled, crushed and closely-sized glass from coloured bottles is also being developed as an alternative to sand for water filtration.

Flat glass is recycled into glass containers, glass fibre and rolled plate glass. Flat glass manufactured by the float glass process is
highly sensitive to impurities, in particular refractory materials that do not melt. For this reason window glass is not taken from demolition sites because of the risks of contamination. The industry is, however, looking at utilising flat glass from fabricators, such as the automobile industry and double-glazing manufacturers, where better quality control is feasible.

In the foundry industry most metal is cast in ‘greensand’ moulds in which a mixture of silica sand and bentonite is mixed with water to give sufficient plasticity for the mould to be formed. Volume producers of castings use automatic systems in which the used mould is disaggregated and the sand recycled with a small addition of new bentonite to make good that destroyed in the casting process. Foundry sand used with chemical binders is also reclaimed using attrition and thermal processing and most is re-used with the addition of some new sand. Spent foundry sand is increasingly used for alternative applications including as asphalt filler, in cement manufacture and in building blocks. About 180 000 tonnes were used for these purposes in England in 2004

Planning issues

Compared to construction sand, silica sand has a number of distinctive characteristics which are relevant to land-use planning:

- **Economic value** — silica sand has a range of applications with many different specifications. It is important to a broad range of downstream, value-added manufacturing industries; individual grades are often not interchangeable in use and tonnages produced tend to be relatively low;

- **Alternatives** — other than glass cullet, there are no alternative raw materials for glass manufacture;

- **Amenity of processing plants** — the processing of silica sand is often complex and generally requires a high level of capital investment. In many cases processing plants operate on a continuous (24 hours) basis, which means that the siting of such plants has to take account of the impact on local residential amenity;

- **Length of planning permissions** — individual sites tend to be long-lasting, and therefore have to be subject to regular reviews of conditions;

- **Impact on designated areas** — some silica sand resources may coincide with sensitive environments and habitats such as heathland. Government policy permits the working of silica sand in some designated areas only in exceptional circumstances;

- **Landbanking** — current Government policy requires that minerals development frameworks contain at least seven years landbanks. Paragraph 47 of MPG15 Provision of Silica Sand in England (the specific planning guidance for silica sand) requires that landbanks of at least 10 years are maintained for individual sites;

- **Transport** — there is pressure to establish less damaging transport alternatives to road at well-established sites with a long term future;

Effects of economic instruments

Silica sand that is used in prescribed industrial and agricultural processes is not subject to the Aggregates Levy. Sands that are unsuitable for these applications are produced as ancillary products at many silica sand sites. These are sold for construction use and are therefore subject to the Aggregates Levy.

Spent foundry sand is subject to the Landfill Tax although a high proportion of this material is now recycled for use as aggregate.

Transport

Most silica sand is transported by lorry and bulk tanker. The only silica sand operation with a dedicated rail link is King’s Lynn in Norfolk. Here rail is used to transport sand to glass manufacturers in the north of England

Some consuming industries require deliveries to service 24-hour operations.
• **Ancillary products** such as construction sand are often an important element of the economic and environmental consideration of a site, influencing quarry design and restoration. Utilisation of these materials, which fall outside industrial sand specifications, is the most sustainable use of the overall mineral reserve;

• **Mineral safeguarding** — Silica sand is a scarce resource. Paragraph 54 of MPG15 emphasises the need for adequate safeguarding of silica sand resources and encourages, where possible, prior extraction of silica sand before other development.

**Further information**


**Authorship and Acknowledgements**

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