



British Geological Survey

mustral minerals

issues for planning Summary

England is well endowed with a wide range of industrial minerals. The sector had an estimated total output of 40 million tonnes of saleable product in 2002, with an exworks value of about £700 million. Output is dominated by the industrial clays, mainly kaolin, and the carbonate minerals, limestone, chalk and dolomite. A number of other industrial minerals also supply important markets. The principal aims of the study were to;

- Provide policy advice for the new Mineral Policy Statement 1 and its associated annexes, which will supercede Mineral Planning Guidance 1 as the core guidance on minerals planning;
- provide authoritative background information on each industrial mineral;
- identify the planning issues that Mineral Planning Authorities (MPAs) will need to consider in evaluating planning applications for these minerals; and
- to identify any distinctive aspects of particular minerals, or groups of minerals, and

'Industrial Minerals' Issues for planning

BACKGROUND

ndustrial minerals are vital to a modern economy. Minerals such as limestone, salt, kaolin and silica sand provide essential raw materials and chemical feedstocks

which underpin manufacturing industry, con-

struction and agriculture. They also have

important environmental applications, such

as water treatment, flue gas desulphurisa-

Below: Value of industrial minerals in

tion and road de-icing.

In late 2002 the Office of the Deputy Prime Minister (ODPM) commissioned the British Geological Survey (BGS) in association with Green Balance Planning and Environmental Services and DTZ Pieda Consulting to carry out an 18-month study on the **Review of plan***ning issues relevant to non-energy minerals, other than aggregates, in England.* (Referred to as 'industrial minerals.')

England, 2002. Carbonates (cement raw materials **Industrial Clays** industrial carbonates) (Kaolin, ball clay, fuller's earth) Silica Sand Fluorspar. barytes, calcite Potash Gvpsum/ Salt/Brine Anhydrite **Total Value £700 million**

the extent to which common policies to achieve sustainable development might apply.

KEY CHARACTERISTICS OF INDUSTRIAL MINERALS

A classification of industrial minerals based on the downstream industries in which they are consumed serves to illustrate their link with important sectors of the economy. Typically, individual industrial minerals are consumed in more than one market sector and each market sector requires a number of different minerals. The minerals are valued for their physical and/or chemical properties. Some are valued principally as sources of specific elements, or compounds, e.g. for use as chemical feedstocks, cement raw materials or plant nutrients. For others it is a combination of physical properties, such as the particle size and shape, and whiteness of kaolin, that form the basis for commercial exploitation. In many cases it is a combination of physical and chemical properties that is desired, such as the silica and low iron content of silica sand, together with its particle size and shape. Subtle differences in the properties of industrial min-



Left: Selectively extracting ball clay, South Devon. Below: Kaolin is mainly used for filling and coating paper. It is also used in ceramic manufacture and as filler in paints, rubber and plastics. © WBB MINERALS.



- Kaolin (china clay)
- Ball clay
- Fuller's earth (bentonite)
- Cement raw materials (limestone, clay and clay/mudstone)
- Limestone, including chalk, and dolomite for industrial purposes
- Silica sand
- Gypsum/anhydrite
- Potash
- Salt
- Fluorspar, barytes and calcite
- Miscellaneous minerals (iron ore/hematite, other metalliferous minerals, slate for industrial applications, serpentine and talc)

Economic minerals covered by the research

erals can make the performance of minerals from one deposit quite different from another limiting the potential sources of supply. The quality of an industrial mineral – that is its suitability for a particular application – is a crucial factor in assessing the importance of any industrial mineral deposit. There are marked differences in the geological occurrence, properties, markets, supply, demand and thus land-use planning implications of the supply of the different industrial minerals. Diversity is a key feature that characterises the sector. Unlike aggregate minerals, many industrial minerals compete in a global market with either exports being the main market (e.g. kaolin, ball clay and potash) or domestic production competing with imports (e.g. fluorspar and cement).

Industrial minerals are widely distributed in England and occur in all regions except London. However, their extent and quality fundamentally reflect geology and many are highly restricted in their occurrence. For example, potash is produced at only one site, the Boulby Mine in the North York Moors National Park. Kaolin and ball clay are confined to the South West, and fluorspar, barytes and calcite mainly to the Peak District National Park. The location of some industrial minerals can create significant profound conflicts of interest with the conservation of highly valued parts of the English landscape. A general order of geological scarcity has been defined although there are

difficulties with this approach. Kaolin and ball clay, for example, have a relatively restricted distribution compared with limestone and chalk, although permitted reserves are fairly large. However, gross permitted reserves of many industrial minerals, such as silica sand and ball clay, mask the multiplicity of qualities that are produced, many of which are not interchangeable in use.

DIVERSITY OF GEOLOGY INFLUENCES

- the size of a deposit, extent of permitted reserves and potential output;
- the method of extraction (quarrying or underground mining); and
- the processing methods and amount of waste produced.

DIVERSITY OF PROPERTIES INFLUENCES

- the range of markets served based on different physical and/or chemical properties;
- the consequent need to meet a wide range of specifications;
- the need to be traded on the basis of specific properties, sometimes to meet a particular customer's requirements;
- the fact that individual qualities are often not interchangeable in use; and
- the need for producers to have close relationships with customers.

Economic importance of industrial minerals

The direct contribution of industrial minerals production to the economy in terms of value and employment is relatively modest. However, the predominantly rural location of producing sites means that these are a significant local economic force in many parts of England. The industry makes an important contribution to employment in rural areas and helps to maintain a well structured rural economy with a diversified skill base.

However, the importance of industrial minerals to the economy is not attributable solely to the value of production and the number of people who are directly or indirectly employed. These materials are also essential inputs to a wide range of downstream industries which make a much larger contribution to wealth creation and employment in the UK.

Planning issues

The main planning issues associated with the supply of industrial minerals are:

'**Need'**: Examination of the economic importance of industrial minerals and how they contribute to wealth creation at the local, regional and national scale is critical in formulating planning policy. Consideration of this issue is essential for making balanced choices on where minerals may be worked, including possible alternatives, and in the evaluation of individual planning applications.

Security of supply: A recurring and central concern expressed by the industrial minerals sector is the need for assurance of a continuity of supply of minerals of the right quality. This is the key to sustaining the UK industries which depend on these essential minerals. Consequently, MPAs need to be aware of the downstream economic consequences of their decisions on planning applications.





Ceramics/Refractories

Far left: Ball clay, kaolin and silica sand are used in the manufcature of a wide range of ceramic products. Left: Sand stockpiles. Middle: Industrial minerals are used as fillers in a wide range of products. Right: Resin coated sand for castings. © WBB MINERALS. Far right: Dolomite quarry. Dolomite is used in steelmaking, glass manufacture, chemicals and in agriculture.



Boulby Potash mine, North York Moors M

Alternatives and recycling

Because of their multiple uses, the life cycle

of industrial minerals is often complex and

opportunities for substitution and recycling

versibly in the manufacturing process and

thus, unlike aggregates and metals, most

are not available for recycling. In general it

is most difficult to recycle minerals valued

for their chemical properties. A major excep-

tion is waste glass where all the ingredients

-silica-soda-lime - are reusable. For some

industrial minerals large tonnages of alter-

derived from the removal of sulphur dioxide

from coal-fired power stations has entirely

manufacture. However, the process requires

large quantities of high purity limestone so

that the demand for one industrial mineral

has been transferred to another.

replaced natural gypsum in plasterboard

natives are available. Desulphogypsum

are variable. The intrinsic properties of

these minerals are often changed irre-









Environmental impacts and sustainable development: The planning system has an important role in applying the principles of sustainable development with regard to industrial minerals. Factors such as best use of the resource - safeguarding from sterilisation, avoiding inappropriate end uses and better use of poorer quality minerals - and reduction in demand through substitution, reuse and recycling, are all important objectives.

Conflict with environmental designations: There is a need to clarify Right: *Finished floatt glass.* © *Pilkingotn Plc.* Below right: *Glass bottle factory.*

most significant profound conflicts of interest.

Other planning issues: Important to specific industrial minerals include mineral waste disposal, underground mining (including impacts of surface development and subsidence), longevity of operations, 'landbanks' and the importance of maintaining supplies of a variety of mineral qualities.



under what circumstances environmental constraints (which would be sufficient to deny the working of more ubiquitous minerals) might be overridden by the economic importance of a specific industrial mineral. In particular, proposals for working industrial minerals in National Parks and Areas of Outstanding Natural Beauty raise the

RESEARCH RECOMMENDATIONS

1. PROVIDE HIGH QUALITY, CONSISTENT AND UP-TO-DATE INFORMATION TO ASSIST THE PLANNING PROCESS

The research identified a fundamental requirement for more and better information on the uses of industrial minerals, the



requirements of the market, and the economic importance of each mineral. Alternative sources of supply and the likely economic consequences of refusing particular schemes are also important.

A series of *Mineral Planning*

Factsheets has been produced. They form a Technical Annex to the main report and are also available as separate documents on www.mineralsUK.com. They go some way to providing this type of information in a succinct but authoritative way. It is recommended that they be kept up-to-date.

2. IMPROVE GUIDANCE TO MPAS ON THE EVAL-UATION OF THE ECONOMIC IMPORTANCE OF INDUSTRIAL MINERALS

A 'checklist' for MPAs for assessing the economic case for individual planning proposals is proposed. This should include evaluation of:

 Local economic benefits – contribution to the rural economy, employment, local businesses, and use of existing infrastrucbetween the research team and representatives of major interest groups, it is considered that the planning system has been taking too reactive a role in respect of these minerals and that a longer-term approach is required.

It is proposed that in designated 'industrial minerals' areas, a commitment could be made to sustain production. Here, the principle of mineral working at some future date would be a priority issue when taking land use decisions. This approach would prioritise local environmental benefits in return for recognising a commitment to future working. Industry would work toward transport of mineral in ways other than by road. This would be justified by the investment in plant (sustained with a guaranteed supply of minerals). Industry would also undertake forward planning for environmental mitigation/ enhancement, such as planting of screening woodlands (to mature before mineral needed to be worked) and creation of new habitats and more robust wildlife networks within working areas. These areas would encompass a positive commitment by the MPA and industry to long-term environmental land management. This approach is unlikely to be appropriate in all cases. However, the procedure has to some extent already been





Above right: Fluorspar, the starting point for the manufacture of fluorine chemicals. Above left: Homogenising gypsum © British Gypsum.

adopted for ball clay in South Devon and may be beneficial elsewhere.

4. BROAD END USE CONTROLS SHOULD BE FOR-MALLY ESTABLISHED, WHERE NECESSARY, TO ENSURE SUSTAINABLE USE OF MINERAL RESOURCES

Current mineral planning guidance (MPG1) aims '...to encourage efficient use of materials including appropriate use of high quality materials...' Economic forces will in most cases support this principle but there have been cases where industrial minerals have been used for less than best purposes. Many existing development plan policies encourage end use controls. However, oper-

Below left: Barrow gypsum mine, Leicestershire © British Gypsum. Below: Kilns for manufacturing cement from limestone and mudstone.





ture in areas where industrial minerals are extracted and processed;

 Wider economic benefits – as essential raw materials for the manufacturing sector, the importance of these downstream industries to the UK economy and to their competitiveness.

3. DEVELOP POLICY ON INTEGRATED LONG TERM PLANNING.

Planning for the supply of industrial minerals is often characterised by periods of limited intervention followed by major applications when significant decisions have to be taken about where, how much or whether to extract minerals. Based on discussions







ators need flexibility in order to respond to changes in the market, therefore formal end-use controls should only be imposed with care. There is a need to clarify the situation in national mineral planning policy guidance.

5. MINERAL PLANNING GUIDANCE SHOULD ENCOURAGE, WHERE PRACTICABLE, THE USE OF LOWER QUALITY RESOURCES, BOTH TO CONSERVE HIGHER QUALITY RESOURCES AND WIDEN SUPPLY OPTIONS.

It is a principle of sustainable development that lower quality resources should be used where practicable. This is to conserve higher quality resources for those applications,



Above: Iron foundry. Silica sand is used for producing moulds for the castings industry. Right: Flue gas desulphurisation plant at a coal-fired power station. Large quantities of high-purity limestone are used to remove sulphur dioxide emissions. Synthetic gypsum is a by-product which replaces natural gypsum in plasterboard manufacture.

which can be served by no other reasonable means, and to widen the supply options.

Use of lower quality resources is a complex issue and opportunities will depend on very specific and local circumstances. Most companies already use resources appropriately. Guidance cannot be prescriptive, so the policy approach should encourage industry to consider the scope to make greater use of lower quality resources. National policy should invite MPAs to have regard to this issue when considering planning applications for working industrial minerals.

The results of this study are published in: 'Industrial Minerals:' Issues for Planning. British Geological Survey Commissioned Report CR/04/076N. 202 pp.

This Summary Report and the Mineral Planning Factsheets can also be viewed and downloaded on www.mineralsUK.com The main *Technical Report* is available from: Sales Desk British Geological Survey Keyworth Nottingham NG12 5GG Tel: 0115 936 3241 Fax: 0115 936 3488 Email: sales@bgs.ac.uk

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Cover photo: Hydraulic mining of kaolin, Cornwall.

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Copies of the Technical Report: Industrial Minerals: Issues for Planning (ISBN 0 85272 499 3) are available free of charge from:

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