

MINERALS IN OUR LIVES

□ Minerals matter to all of us

Every one of us is dependent on the earth's mineral resources. Minerals extracted from the earth underpin every aspect of our daily life including the food we eat, the homes we live in, the power we use, where we work and how we travel and communicate with others.

In the UK each person uses every year an average of over ten tonnes of minerals as diverse as salt, sand, coal and iron ore. Even with an important contribution from recycling, minerals extracted from the earth still supply most of our daily needs. These include metals, construction materials such as sand and gravel that are essential for our infrastructure, and many other ubiquitous manufactured materials such as glass, ceramics and plastics.

All natural minerals must be found, mined or quarried and processed into useable forms in order to provide the materials and manufactured products on which our standard of living is based. We may not always be aware of it, but minerals have an essential role in our everyday existence and they are vital for continued economic, social and technological development.



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□ Food and drink

Although it may not be obvious, minerals extracted from the earth are actually important to what we eat and how we eat.

Phosphorus and potassium, two of the three main plant nutrients essential for agricultural fertilizers, are derived from naturally occurring phosphate rock and potash. Many other products derived from natural minerals e.g. lime, boron and trace metals, are also widely added to the soil with the object of improving yields and producing better quality food.

Salt (sodium chloride) is added to many foods during cooking and preparation and many other mineral-based products are added to processed foods. For example, calcium carbonate is used in bread, biscuits and frozen desserts. Clean

drinking water, our most fundamental dietary requirement, is produced by treatment processes involving natural mineral products such as sand, gravel and calcium carbonate.

Mineral-based products are also important in the packaging, production and preparation of food. Food and drinks are commonly marketed in aluminium or steel cans or in glass bottles and jars made from silica sand. The implements we use in the kitchen for cooking, serving and preparation are usually metallic (aluminium, steel or copper) or ceramic made from fired clays.



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□ Energy

Constant, reliable energy sources are essential to our everyday lives. Energy is vital to all industries, services and transport. In our homes and workplaces we need heat, hot water and electricity to supply our basic need for food and shelter and to drive a multitude of electrical appliances.

In the UK each person consumes approximately 1 tonne of oil per year, mainly as fuel for transport, and similar amounts of natural gas and coal, much of it indirectly in the form of electricity. Power stations burning coal or gas are responsible for more than 70% of the electricity we use in industry and in our homes. Energy consumption in the service and industrial sectors has remained fairly constant in recent years but consumption for domestic purposes and transport has continued to grow.



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□ Getting around

Every journey we make, whether in a car, a train, a plane or on foot, depends on a wide variety of minerals. Construction and maintenance of roads and paths consumes large amounts of aggregates, while railway tracks made from steel are laid on a base of crushed rock. Air, sea and rail terminals require large amounts of construction minerals to build and maintain.

Cars, buses, trains, ships and planes are all manufactured mainly from metallic materials such as steel and aluminium. Modern aircraft design is only made possible by the use of aluminium, a very light but durable metal. Aircraft engines depend on high performance alloys made from metals including nickel, cobalt, chromium, aluminium and titanium. In each motor car there are over 15 000 components that are made from minerals, including about 60 kg of aluminium, 10 kg

of copper and 9 kg of zinc in an average car, as well as platinum in the catalytic converter and gold on electrical connections.



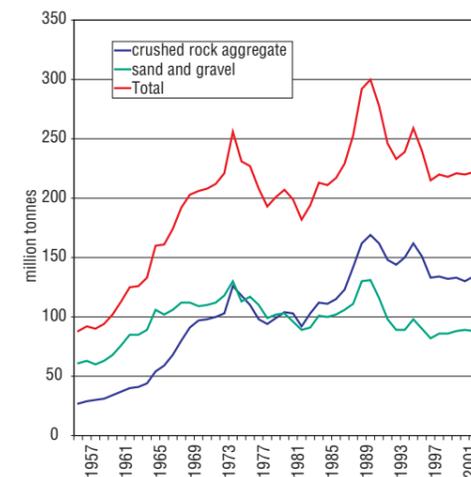
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□ The built environment

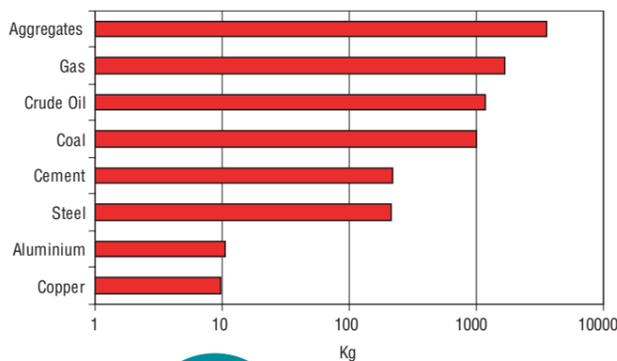
In developed countries most buildings, such as houses, schools, hospitals, offices, airports and shops, are constructed from mineral products. Steel is used for the framework of large buildings, while clay is the basis of bricks and roofing tiles, cement is made from limestone, clay, shale and gypsum; sand and gravel and crushed rock are required for concrete. About 60 tonnes of aggregate (crushed rock, sand and gravel) are required to build an average house in the UK and approximately 180 000 new houses are built each year. A total of about 250 million tonnes of aggregate are used in construction projects each year in the UK.

Inside our buildings mineral products are used for many purposes. Copper is essential for plumbing and wiring, and steel has many uses from radiators to nails and screws. The main ingredient of the glass in our windows is silica from high-purity sand deposits. Bathroom fixtures and fittings and ceramic tiles are made from specific types of clay, while plaster and plasterboard are manufactured from gypsum. The paint on our walls contains a number of mineral products — white pigments are manufactured from titanium minerals and red pigments from iron minerals, while extenders and fillers are usually made from barium and calcium minerals. Even a light bulb has components made from tungsten, copper, nickel, zinc and sand.

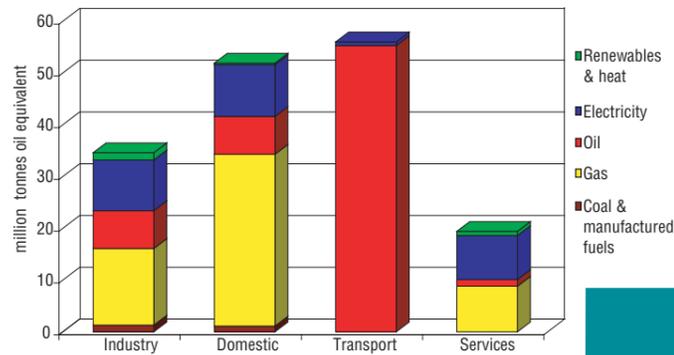
UK consumption of natural aggregates 1955-2002



UK per capita commodity consumption 2002



UK energy consumption by sector 2003



□ Technology and communications

We are dependent on information technology in our daily lives. Computers play an integral role everywhere, while telecommunications and electronic instrumentation are vital to all kinds of essential services. These developments have led to increased demand for a wide range of minerals and metals in recent years. For example, computers and mobile phones contain numerous metals, including copper, gold, platinum, tantalum, tin, zinc and nickel.

Rare, precious metals, such as gold and platinum, have traditionally been used in jewellery and investment products, but also have many industrial and technological applications. Platinum, for example, is used in the manufacture of articles as wide-ranging as computer hard disks, autocatalysts, electrical components, heart pacemakers and Post-it® notes, while applications of gold include circuit boards, resistors and recordable CDs.



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□ Then and now

Our dependence on a growing range of minerals is increasing. Historically, exploitation of minerals has allowed us to continuously improve our standards of living. From the Stone Age, through the Copper, Bronze and Iron Ages, earlier societies are classified by their use of minerals; today we take further developments in our standard of living for granted. Our expectations of improvements in travel and technology, our requirement for high quality affordable housing and better healthcare and our increasing demand for consumer goods creates a continued need to find, recover and process a diverse supply of minerals. However we should be aware of the true costs of this demand, and be prepared to embrace the principles and practices of sustainability in all aspects of minerals extraction, processing and use.

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