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Scotland's building stone industry: a review

Minerals & Waste Programme
Commissioned Report
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Scotland's building stone industry: a review

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Foreword

Scotland has one of the richest legacies of traditional (pre-1919) buildings and other stone structures of any country in the world, but the building stone industry that created that legacy is now a small fraction of its former size and struggling to survive as the use of imported stone continues to grow. This report presents an objective review of the building stone industry in Scotland today. It includes: a brief synopsis of its history; evidence of its current fragile state, and the threat this poses to the historic and natural environments; an analysis of the potential for the industry to grow, and the benefits that a stronger indigenous industry could bring; a description of factors that are holding back its development ('barriers to growth'); and a list of practical steps that can be taken by the industry and other stakeholders to encourage and facilitate growth.

The report was commissioned by Historic Environment Scotland and has been compiled by staff of the BGS Building Stones team. The authors would like to thank Graeme Hadden, Marcus Paine, John McKinney, Peter Stewart and Colin Tennant.

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1 Introduction

Scotland has a long history of building with stone, and today a substantial stone-built heritage – including Neolithic structures, castles, bridges, boundary walls, dwelling houses, paved areas, public buildings, monuments, gravestones, carved panels and artworks – makes a major contribution to the historic landscape and both the urban and rural fabric of the country. For many years, and particularly in the 18th and 19th centuries, the development of the built environment was underpinned by a large and widespread stone-working industry comprising several thousands of (mainly small) quarries and supporting tens of thousands of jobs. While much of the building legacy has survived to the present day, the quarrying industry that supported it has all but disappeared; today, the Scottish building stone industry[1] is comprised of little more than a handful of quarries, and its future is threatened by weak home-grown demand and the growing use of imported stone.

The state of the stone industry in Scotland and its future prospects have been the subject of two previous reports, published in 1980 and 1997. Those reports, which were based on thorough reviews of available literature and detailed consultations with a wide range of stakeholders, are comprehensive and insightful; much of the content, particularly in the 1997 report, remains relevant today. This new report presents a review of the Scottish building stone industry today, but does not duplicate the approach of the previous two reports. The information and opinions expressed here are based on: experience the authors have gained working within the BGS Building Stones team and with colleagues in Historic Environment Scotland[2] Conservation Directorate; a review of available literature; and limited consultation with representatives of the stone industry in Scotland.

The report is divided into three main sections dealing with the past, present and future of the stone industry in Scotland. Section 2 provides some historical context, including a summary of the development, impact and subsequent collapse of the Scottish stone industry and a brief review of changes within the industry (or affecting the industry) since the 1997 report was published. The state of the stone industry today is reviewed in section 3; the section includes statistics comparing the quantity and value of stone produced in Scotland and imported into Scotland, brief assessments of the structure and profile of the industry, and a summary of the policy environment within which the industry operates. The potential for the industry to grow is examined in section 4, with assessments of the potential demand for Scottish stone and available resources, the benefits that a bigger stone industry would bring, barriers to growth, and practical steps that could be taken by stakeholders to encourage and facilitate growth in the industry. A summary of key points and the conclusions arising from this review is presented in section 5.

[1] The term ‘building stone’ is used in this report to refer to any naturally occurring stone that has been cut or shaped into blocks or slabs for use in the construction of buildings and other structures. In this context it is nearly synonymous with the widely used term ‘dimension stone’.

[2] This organisation was known as Historic Scotland prior to a merger with Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) in October 2015.

2 The past: rise and fall of the stone industry in Scotland

A detailed review of the history of the stone industry is beyond the scope of this report, but sufficient details to provide historical context for later sections of the report are presented in section 2.1. A summary of the outcomes of two previous reviews of the stone industry is presented in section 2.2.

2.1 HISTORICAL PERSPECTIVE

- Stone has been used as a construction material throughout recorded history in Scotland. During most of that time, stone generally would have been sourced close to the construction site to meet a specific need. Gathering loose blocks would have been preferred to quarrying, though blocks of stone would have been quarried when loose material was scarce or stone to suit a particular function was needed (e.g. tabular blocks to act as lintels). The advent of a trade in building stone, and later an industry, is not recorded.
- A true building stone industry, with multiple businesses engaging in organised trade, probably did not develop until the early part of the Industrial Revolution. The industry then would have grown very quickly as the population of Scotland boomed and rapid developments were made in mechanisation and organised manpower.
- Scotland has a very diverse geology and the country historically was able to supply virtually all of its own building stone needs, including slate for roofing, sandstone and granite for walling, and flagstone, whin and granite for paving.
- Initially, the industry would have developed mainly to supply stone for local needs. Consequently at least one building stone quarry was developed in the vicinity of most settlements; each quarry produced a 'local stone' that was used mainly in the local area. Stones used for special purposes, like slate and paving, were exceptions and would have been transported beyond the local area.
- The 'local stone' typically changes over small distances in Scotland (as a consequence of the varied bedrock geology), so the character of stone structures and settlements also changes considerably from place to place. The variability of local building stones made (and continues to make) a major contribution to the distinctiveness and 'sense of place' that characterises many of the villages, towns and even cities in Scotland.
- At the peak of the Industrial Revolution, around the mid-19th century, the stone industry in Scotland was of considerable economic importance; many thousands of people were employed throughout the country in hundreds of building stone quarries (Figure 1), and many more were employed in related activities such as transport and construction. In many places the industry sustained entire communities and had significant social and cultural, as well as economic, impact.
- At this time the Scottish building stone industry produced internationally renowned commodities and exported stone, skilled people and important technological innovations around the world (along with the Scottish diaspora); Scottish stone was used in civic buildings and monuments in many countries.
- The stone industry declined rapidly towards the end of the 19th century and in the early part of the 20th century due to changes in the labour market, the widespread adoption of cheaper building materials, changing architectural styles, and finally the Great War.
- Today in Scotland a paradoxical situation exists whereby the country has a vast stone-built heritage (probably more stone buildings than any other country on a *per capita*

basis), yet the building stone industry that produced it has all but disappeared. Fewer than twenty quarries currently produce some form of building stone.

- Today, Scotland has around 450,000 traditional buildings[3] (Historic Scotland, 2011) that are ageing and increasingly in need of repair due to prolonged exposure to the elements and, in many cases, poor maintenance. Individuals and communities in general are less connected with the traditional built environment, and the materials and skills that were used to create it, than they were in the past.
- The very restricted supply of indigenous building stone often makes it difficult to source suitable matching stone to use in repairs. This, together with the loss of traditional knowledge and skills in working with stone, presents a substantial risk to the medium- and long-term health of many stone buildings. The scale of this problem has been highlighted by a number of organisations, notably Historic Environment Advisory Council of Scotland (HEACS, 2006).
- Nearly all of Scotland's historical building stone quarries now lie disused; some have been filled in, some are threatened with development, and many are returning to nature.
- The near-absence of an indigenous building stone industry throughout much of the last century means that today there is a shortage of knowledge and skills in key areas: for example, in operating a building stone quarry and in repairing the stonework in traditional buildings. The use of inappropriate materials (stone and mortar) in repairs, which can lead to accelerated stonework decay, is a widespread problem in Scotland.
- Today, there is a growing demand for natural stone to use in building repairs and in new buildings. However, the small size of the Scottish stone industry means that much of the current demand is met by imports.

[3] Buildings constructed before 1919.

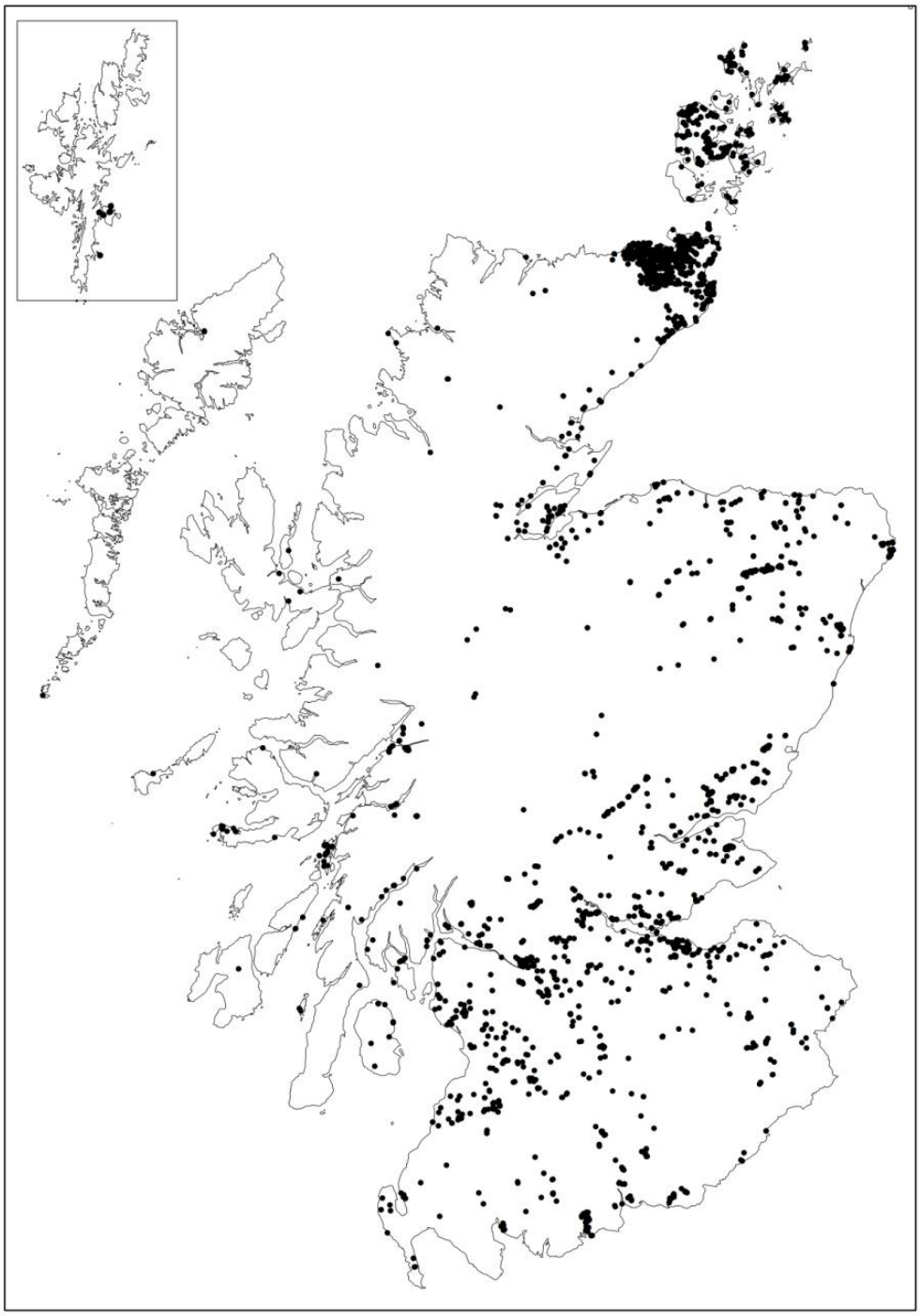


Figure 1 Locations of historical building stone quarries in Scotland

Every dot on the map represents a record of a building stone quarry in the BGS Database of Mines and Quarries ('BritPits'). The database currently holds approximately 3,500 records of building stone quarries in Scotland, and several hundred more are added each year. Many of the recorded quarries occur in closely spaced clusters, and many such clusters appear as a single dot at this scale of observation. Some clusters are representative of the situation on the ground today (i.e. two or more closely spaced quarries can be observed on the ground), while others reflect the historical development of quarrying at a site and may not be representative of the situation on the ground today; for example, several historical quarries may now have amalgamated, so there may be several records in the database but only one large quarry on the ground today. For this and other reasons it is difficult to gauge the true number of historical building stone quarries that there have been in Scotland, and how many are still extant today.

2.2 PREVIOUS REVIEWS OF THE STONE INDUSTRY

The state of, and future prospects for, the stone industry in Scotland have been the subject of two previous comprehensive reviews. The first, entitled *A future for stone, A study into the potential use of stone in new building*, was commissioned by the Stone Federation and the (then) Department of the Environment, compiled by Hutton + Rostron (architects), and published in 1980. The second, entitled *A Future for Stone in Scotland*, was commissioned by Historic Scotland, compiled by Hutton + Rostron (architects), and published in 1997. In both studies the authors set out to examine ways in which the stone industry might "arrest the decline in the use of natural stone in buildings, in particular the scope for developing new products suitable for modern forms of construction". The earlier study took into consideration the whole of the UK, while the later one focused on the stone industry in Scotland.

Both previous reviews are based on published information and detailed consultations with a wide range of stakeholders. Each report contains a comprehensive assessment of the stone industry at the time and a wealth of information and insight, much of which is still relevant today. A full summary of their content is beyond the scope of the present study, but the main proposals that were presented in the 1980 and 1997 reports, which in general terms were intended to re-invigorate the industry, are tabulated in Appendix 1 of this report, with a note of progress (if any) since 1997.

The following observations are based mainly on the information in Appendix 1.

- The 1980 report contained eight proposals and the 1997 report contained twenty-two proposals.
- Six of the eight proposals made in 1980 are included in the proposals made in 1997, though several are divided there into a number of more detailed proposals. The re-appearance of many of the 1980 proposals in the 1997 report is perhaps not surprising, as both reviews were conducted by the same organisation, but it indicates that the main problems and proposed solutions had not changed significantly in the intervening period.
- The 1980 report included few details of who should be responsible for implementing each proposal, but the 1997 report included a detailed plan for how its proposals should be implemented, and which organisations should lead. The plan included the formation of a 'provisional development committee' (PDC), a Stone Liaison Committee (to supersede the PDC), and a Natural Stone Institute. The 'stone industry' and the Stone Federation (the industry's main representative body in the UK) were identified as being responsible for implementing eight of the twenty-two proposals.
- Approximately half of the 1997 proposals were taken forward shortly after publication of the report; among the most notable outcomes were the establishment of a Natural Stone Institute (NSI) and the Scottish Stone Liaison Group (SSLG). However, a lack of financial support from the stone industry meant that Historic Scotland subsequently stepped in to provide financial support for SSLG, and a few years later NSI merged with SSLG. For several years SSLG made progress in a number of areas, but the organisation was taken over and absorbed by Historic Scotland in 2010 when it became apparent that funding it as a separate entity was not sustainable. Historic Scotland took forward areas of activity initiated by SSLG but due to pressures on public spending and resultant reduction in budgets it has not been able to justify further investment in this area of work.
- Just six of the twenty-two proposals made in the 1997 report have produced outcomes that to some extent remain tangible today (proposals f, m, q, s, t and u in Appendix 1).

Other changes since 1997 that have had an impact on, or have the potential to impact, the Scottish stone industry include the following.

- The Scottish Government has been established with a range of devolved powers that have the potential to influence planning and other factors relating to the building stone industry (e.g. rural affairs, housing, the environment, and education and skills).
- Several developing countries, including China, India and Brazil, have emerged as major exporters of cheap stone.
- The internet has emerged as the dominant means of disseminating information, and a key tool for advertising and business development.
- The popularity of natural stone for use in new-build projects and paving has increased.
- Several new mechanisms have emerged for public funding of conservation and regeneration work, much of which involves building stone. These include the Heritage Lottery Fund (established in 1994, since when approximately £6 billion has been awarded to over 36,000 projects throughout the UK), and Historic Scotland's Conservation Area Regeneration Scheme (CARS; established in 2005, since when approximately £33 million has been awarded to fifty-four projects in Scotland). The Glasgow and Clyde Valley City Deal (a recent agreement between the UK government, the Scottish government and eight local authorities to set up a £1.13 billion Glasgow and Clyde Valley Infrastructure Fund) and the similar, recently announced Aberdeen City Region Deal (with a planned £0.5 billion of investment) are other sources of substantial public funding that will support regeneration and many other activities in two of Scotland's major cities, and should produce an increase in the demand for natural stone in Scotland in the coming years. Other cities currently are involved in negotiations with HM Treasury regarding similar arrangements.
- A substantial amount of research and guidance relating to traditional construction materials and the built environment has been published, some of which is concerned directly with building stones. This includes several series of authoritative reports and guides related to the historic built environment produced by Historic Scotland[4], and the publication *Natural Stone Masonry in Modern Scottish Construction* (Urquhart, 2008), which was managed by SSLG. These are made publicly available and are an important (and growing) source of information about Scottish building stone.
- Historic Scotland and Natural Environment Research Council (as represented by BGS) established a Memorandum of Agreement for Grant-Aided Research in 2011 to "promote greater knowledge of and better understanding of the role of indigenous materials, in particular natural stone, in the creation and continued conservation of the built environment in Scotland". Activities conducted to date within this agreement build on a body of work that previously had been undertaken by both organisations to re-establish a knowledge base for Scottish building stones, and include a project to create a Building Stone Database for Scotland; the database is scheduled to 'go live' in late 2016.

[4] Including Historic Scotland INFORM guides, Short Guides, Technical Advice Notes, Guides for Practitioners, Research Reports, Case Studies and Technical Papers.

3 The present: the stone industry in Scotland today

Reliable information about quarrying activity and stone supply is difficult to obtain and compare for several reasons, some of which are mentioned below. The information presented in this section of the report is based on an assessment of published records and details supplied anecdotally by quarry operators.

3.1 STONE PRODUCED IN SCOTLAND

The most recent government figures for building stone sales in Scotland are summarised in Table 1. Unfortunately, the usefulness and accuracy of some of these is limited by the way some stone products are classed and because some quarry operators choose not to disclose sales figures.

Table 1 Extractors' sales of building stone in Scotland in 2012

Stone type *	Tonnes sold
Sandstone	14,000
Igneous rock	160,000 **
Limestone & dolomite	<500 ***
Slate	0 ****

(Source: Department for Communities and Local Government, 2014)

* These are the only 'types' of stone for which figures are provided where the end-use is 'building stone'.

** The total tonnage reported for all regions of the UK is 165,000 tonnes but no single region of the UK has a tonnage recorded, either because the total for that region is 'nil or less than 500 tonnes' or because the information was 'withheld to avoid disclosure'. Four of the regions of Scotland fall into the latter category, whereas every other region of the UK falls into the former. The implication, therefore, is that the great majority of the total figure for the UK (at least 160,000 tonnes) was produced in just four regions of Scotland. However, such a figure is vastly greater than is suggested by the information supplied anecdotally to the authors of this report by quarry operators in Scotland (see Table 2), so it is assumed that much of the reported 165,000 tonnes does not relate to building stone in the sense in which it is used here.

*** Estimated by the authors of this report because the value recorded for all regions of Scotland is 'nil or less than 500 tonnes'. When the data were collected (2012) there probably was only one quarry (Ledmore, in Sutherland) producing limestone (marble) for building stone in Scotland.

**** The reported figure for roofing slate (17,000 tonnes) is for the whole of the UK. To the authors' knowledge, roofing slate has not been quarried in Scotland for many years, so a value of zero has been inserted.

Details for all the 'active' building stone quarries in Scotland are presented in Table 2 and their geographical distribution is shown in Figure 2. All of the figures in Table 2 were provided to the authors specifically for this study by quarry operators, and as such are considered to provide a more accurate picture of the stone industry today than those in Table 1.

The following points are of note.

- Only seventeen quarries in Scotland currently produce building stone. Two of these (the Spittal quarries in Caithness) are geographically adjacent but are recorded separately in Table 2 because they have different operators.
- Only seven quarries are active continuously. These include the three 'Caithness Flagstone' quarries, the largest producer of sandstone in Scotland (Locharbriggs quarry), and three quarries that produce 'whin' (a dark grey igneous rock); the latter three quarries operate continuously only because they also produce stone for aggregate (in greater quantity than building stone). The remaining ten quarries operate intermittently due to low and/or fluctuating demand.
- The seventeen quarries are operated by twelve different companies, of which nine are based in Scotland and three are based in England. The latter three companies are

relatively large operations, each of which operates a portfolio of quarries in England and one quarry in southern Scotland.

- Most of the active quarries produce either sandstone or siltstone (or both). Whin is produced at three quarries by the same operator. No quarries in Scotland currently produce roofing slate, granite, limestone or marble as building stone.
- The average annual tonnage of building stone produced at individual quarries in Scotland ranges from roughly 500 tonnes to 7,000 tonnes.
- Currently, approximately 40,000 tonnes of building stone is produced in Scotland every year, of which around 34,000 tonnes is sandstone and siltstone.
- 60-70% of the flagstone produced in Caithness quarries (Caithness Flagstone) and around 30% of the whin is exported (used outside Scotland). Other than this, virtually all of the building stone produced in Scotland is used in Scotland.
- Approximately 160 people currently are employed by companies producing building stone in Scotland.
- Sixteen of the seventeen currently active quarries are on the mainland and one is in the Orkney Islands. In general terms the quarries are distributed fairly evenly from north to south of the country, but there are none in the west of Scotland and only four in the Central Belt. Roughly half of the quarries (eight) occur in closely spaced clusters, in Caithness, Moray, and Dumfriesshire.
- Of the seventeen currently active quarries, six have become active within the last fifteen years (Clashach, Cullalo, Drumhead, Liddles, Meadow Hillock and Pitairlie). Only one of these (Meadow Hillock) is a new quarry; the others are historical quarries that have been re-opened. Two quarries (Drumhead and Pitairlie) were re-opened by the farmers whose land they are sited on, two others (Cullalo and Clashach) were re-opened by established quarriers, one (Liddles) was re-opened by a Local Authority and one (Meadow Hillock) by a first-time quarry operator.
- Only a handful of the active quarries produce stones that have genuine heritage significance, notably Locharbriggs quarry (Dumfriesshire ‘red’ sandstone) and the Caithness quarries (Caithness Flagstone), although several quarries produce stone that is a good substitute for a heritage stone. Among the many important heritage stones that currently are not quarried are: Highland Border Slate, West Highland Slate, Southern Uplands Greywacke, Aberdeen (and Aberdeenshire) Granite, Dalbeattie Granite, Raddery Sandstone, Craigleith (Edinburgh) Sandstone, and Giffnock (Glasgow) Sandstone.

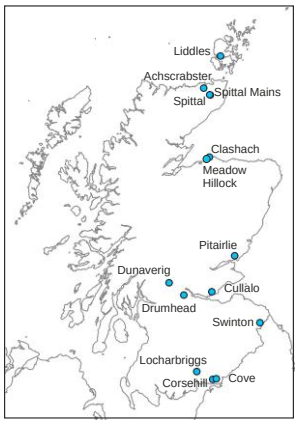


Figure 2 Locations of active building stone quarries in Scotland

The locations of three quarries producing ‘whin’ have been withheld by the operator for commercial reasons. Shetland has no active building stone quarries.

Table 2 Summary details for active building stone quarries in Scotland

The information in this table was supplied by quarry operators in July 2015.

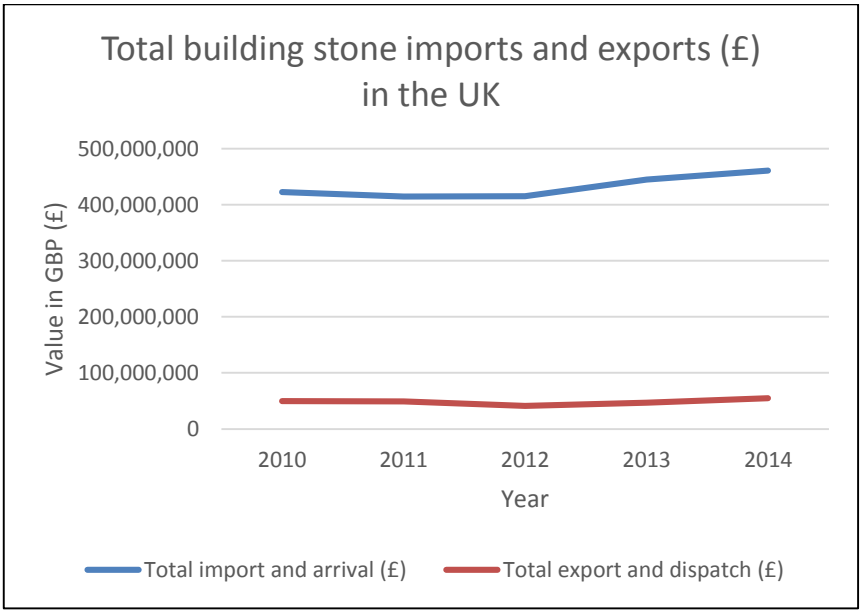
Quarry name	Location	Stone type	Major end-use	Annual tonnage [1]	Prop'tn used in Scotland (%) [2]	Quarry activity [3]	Jobs [4]
Clashach	near Hopeman, Moray	sandstone (buff)	cladding, paving (slabs), walling	1,000	90	I	4
Corsehill	near Annan, Dumfriesshire	sandstone (orange)	cladding, paving (slabs), walling	1,500	90	I	2
Cove	Kirkpatrick Fleming, Dumfriesshire	sandstone (orange)	cladding, walling	1,000-1,500	90	I	2
Drumhead	near Denny, Stirlingshire	sandstone (buff)	walling	750	90	I	2
Liddles (Clestrain)	near Stromness, Orkney	sandstone (buff)	paving (slabs)	2,000-3,000	90	I	?
Locharbriggs	near Dumfries	sandstone (orange)	cladding, walling	7,000	90	C	12 (2)
Meadow Hillock	near Burghead, Moray	sandstone (buff)	paving (slabs), walling	500	90	I	1
Pitairlie (Denfind)	near Monifieth, Angus	sandstone & siltstone	paving (slabs), walling	4,000-5,000	90	I	20 (2)
Achscrabster	near Thurso, Caithness	sandstone & siltstone	paving (slabs)	10,000	30-40	C	50 (20)
Spittal	Caithness	sandstone & siltstone	paving (slabs)				
Spittal Mains	Caithness	sandstone & siltstone	paving (slabs)				
Swinton	near Kelso, Scottish Borders	sandstone (buff)	walling	2,000-2,500	90	I	28 (2)
Cullalo	near Burntisland, Fife	sandstone (buff)	walling	1,500	90	I	40 (3)
Dunaverig (Ruskie)	near Thornhill, Stirlingshire	sandstone (grey)	walling	1,000	90	I	
name withheld	location withheld	whin (dolerite)	paving (setts, blocks, kerbs), walling	4,000-5,000	70	C	
name withheld	location withheld	whin (dolerite)	paving (setts, blocks, kerbs), walling				
name withheld	location withheld	whin (dolerite)	paving (setts, blocks, kerbs), walling				

[1] Average annual tonnage sold in recent years, estimated by quarry operator. [2] Estimated by quarry operator; the maximum value entered is 90% because quarry operators cannot be completely certain that all the stone they sell is used in Scotland. [3] C = quarry operates continuously, I = quarry operates intermittently. [4] numbers not in brackets are total employees in company; numbers in brackets are employees working in quarries (where known).

3.2 STONE IMPORTED INTO SCOTLAND

HM Revenue & Customs (HMRC) publishes figures for the amount of building stone imported into the UK every year, but the amount of building stone imported into Scotland is not recorded directly so must be estimated from the UK figure. For the purpose of this study the amount of stone imported into Scotland is assumed to be the same proportion as Scotland's current share of UK GDP (roughly 8.8%).

The value of stone imported into and exported from the UK in recent years is shown in Figure 3. Figure 4 shows where most of the imported stone is coming from.



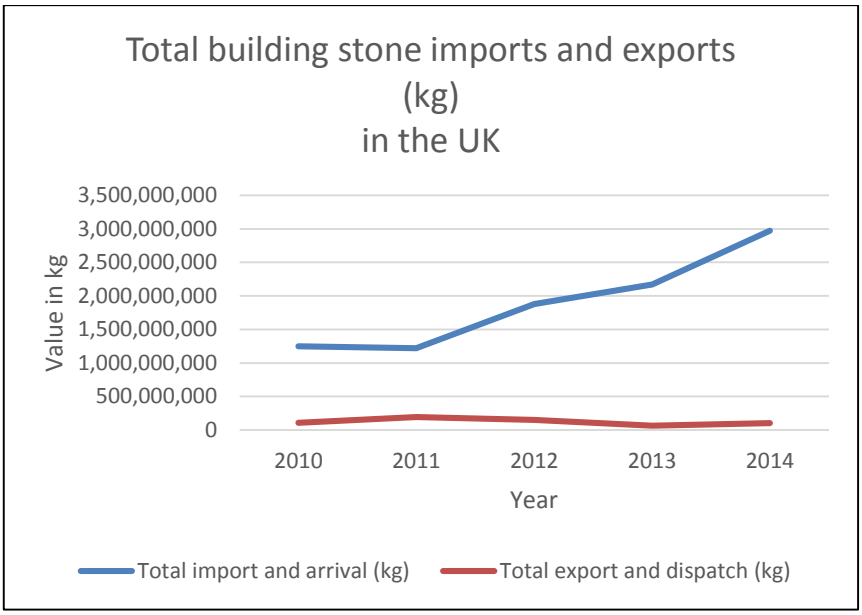


Figure 3 Total building stone imports and exports for the UK since 2010

Data are from HMRC Commodity Export/Import tables. 'Import' and 'arrival' refer to stone brought from outside the EU and inside the EU, respectively. 'Export' and 'dispatch' refer to stone travelling beyond the EU and to the EU, respectively. In the text, the terms 'import' and 'export' refer to all imported or exported stone.

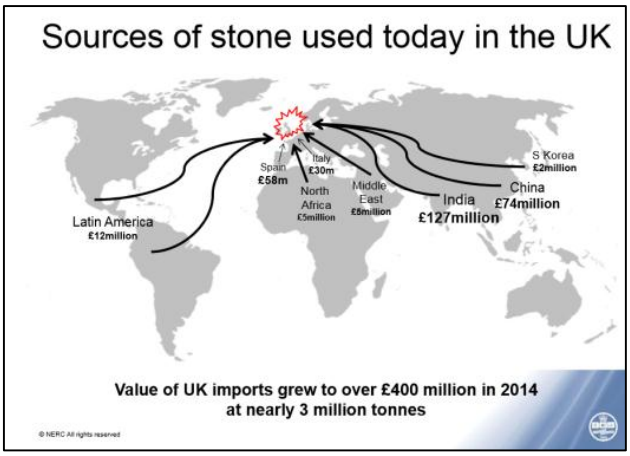


Figure 4 Sources of building stone imports to the UK

Data from Bignell (2015)

The following points are of note.

- The monetary value of UK building stone exports has remained broadly steady since 2010, at roughly £50 million.
- The monetary value of UK imports was broadly steady between 2010 and 2012 but climbed slightly in 2013 and again in 2014 to reach approximately £460 million.
- The monetary value of building stone imported into the UK in 2014 was approximately 8.5 times that of exported stone, representing a substantial net trade deficit in this commodity class for the UK.
- In 2014, exported stone had an average value of roughly £550 per tonne and imported stone had an average value of roughly £150 per tonne. These figures should not necessarily be compared directly as they do not take into account factors such as the type and quality of the product, and taxation.
- Expressed as weight (kg), total exports of building stone have fluctuated within a relatively narrow range since 2010 (between roughly 60 and 200 million kg) but in 2014 were significantly lower than they had been in 2011. By contrast, the weight of imported stone has increased dramatically since 2011, from approximately 1.2 billion kg in 2011 to 3 billion kg in 2014. This implies that the average cost per kg of imported stone has fallen by around two thirds since 2011 whereas the average cost per kg of exported stone has risen slightly.
- The value of stone imported into Scotland in 2014 was approximately £40.5 million and the weight of imported stone was approximately 262 million kg (both calculated as 8.8% of the UK total).
- The total amount of stone used in Scotland can be calculated as *the sum of stone produced and used in Scotland plus stone imported into Scotland*, which for 2014 was:

  27,125 tonnes + 262,000 tonnes = 289,125 tonnes.
- In terms of both monetary value and weight, the proportion of stone used in Scotland that comes from other countries has been rising since 2011.

3.3 ORGANISATION, MARKETING AND PROFILE

3.3.1 Organisation

There currently is no organisation that is dedicated solely to promoting and representing the stone industry in Scotland, but two organisations claim to represent the industry at a UK/GB level.

- Stone Federation GB (SFGB) describes itself as "the official trade association for the natural stone industry". SFGB currently has roughly 240 member organisations; ten of these are based in Scotland but just four are quarry operators. SFGB has a Scotland 'branch', represented by a Chairman and Deputy Chairman.
- Mineral Products Association (MPA) describes itself as "the trade association for the aggregates, asphalt, cement, concrete, dimension stone, lime, mortar and silica sand industries". MPA has members in all parts of the UK; roughly twenty are based in Scotland, of which just two produce building stone. MPA has only recently included 'dimension stone' within the portfolio of industry sectors that it represents, and has recently published a document setting out key issues for the dimension stone industry, in particular those relating to planning (MPA, 2015a). MPA has also published a 'Government & Industry Action Plan' for the mineral products and quarrying industry (MPA 2015b), but there is no mention within it of building stone or dimension stone.

3.3.2 Marketing and profile

The marketing of Scottish building stone is handled almost entirely by individual companies. Each company has a website, but an assessment of the degree to which each actively markets their stone is beyond the scope of this study.

Most of the stone produced in Scotland is marketed and sold directly by the quarry operators. A small proportion is sold by companies that supply stone but do not produce it; in general, these companies deal mainly with imported stone (sourced from England and overseas), but some include one or two popular Scottish stones such as Caithness Flagstone and Dumfriesshire 'red' sandstone. In most cases the stones are sold under trade names that do not indicate (or provide only a vague indication of) their original source.

In the UK, all of the main events, facilities and organisations that are designed to market or raise awareness of natural stone are in England.

- The Natural Stone Show, the UK's only major trade event dedicated to natural stone, is held every two years in London.
- The National Stone Centre, which provides a range of attractions including a visitor centre, shop, Geo-Trail, training courses and exhibitions, and is designed to raise awareness of natural stone and promote its use, is set within six disused limestone quarries at Wirksworth in Derbyshire.
- The English Stone Forum (ESF), an organisation governed by representatives of industry, conservation groups and a range of professional organisations, works to support the production and use of English building stone. There has been no equivalent of the ESF in Scotland since the demise of the Scottish Stone Liaison Group.

Every year several major international trade fairs focussing on, or incorporating, natural stone are held in countries that are (or are becoming) major exporters of stone. Until relatively recently the main focus of these events was decorative stone (for tiles, work tops etc), but stone for all end uses is now displayed at many events. As far as the authors are aware, Scottish building stone has not been promoted at an international trade fair in recent years.

3.4 CURRENT POLICY RELATING TO BUILDING STONE

Policy statements that are relevant to the extraction and use of building stone in Scotland today are summarised in Appendix 2. The following points are of note.

- At least three tiers of governance – European Parliament, Scottish Government and Scottish planning authorities (including national park authorities) – issue policy statements (or directives) that impact on the extraction and use of building stone in Scotland. The Scottish planning system is a devolved matter, so UK government policy is not relevant in this case.
- European Union Procurement Directive '2014/24/EU on public contracts', which is intended to open public procurement to fair competition within EU member states, requires that "technical specifications shall not refer to a specific make or source" of product (the relevant original wording is presented in Table 3 of Appendix 2). This implies that building stone from a particular quarry, district or country cannot be specified for any public project in an EU member state. However, some exceptions are allowed, for example to meet certain "performance or functional requirements", which means that Scottish stone legally can be specified for repairs to (at least some) traditional buildings or historic environments. What is less clear is the extent to which Scottish stone can be specified for new construction, for example where a new building, extension or paved area needs to be 'in keeping' with a surrounding historic environment. Uncertainties over the way the directive should be interpreted, and reluctance amongst specifiers to risk a legal challenge from other stone suppliers or from the European Parliament, has resulted in a situation where Scottish stone is virtually never specified for new construction in public projects. As a result of the directive Scottish stone producers (and all other stone producers in EU member states) must compete mainly on the grounds of cost in the procurement process, and in general this does not favour Scottish stone. The directive does not prevent projects from using stone sourced from outwith the European Union, so many publicly funded new construction projects in Scotland use cheap stone imported from elsewhere in the world[5].
- The National Planning Framework (NPF), the Scottish Government's strategy for long-term spatial development, makes occasional reference to the sustainable use of natural resources and a specific commitment to "safeguarding our natural and cultural assets" (which presumably include building stone resources and traditional buildings, respectively), but contains no statements that relate directly to building stone.
- Scottish Planning Policy (SPP), a statement of Scottish Government policy on how nationally important land use planning matters should be addressed across the country, contains (in its most recent version) a number of statements[6] that support the production and use of building stone in relation to the following topics: 'placemaking', 'promoting rural development', 'valuing the historic environment', 'planning for zero waste' and 'promoting responsible extraction of resources' (see details in Table 4 of Appendix 2).

[5] Recent examples of imported stone being used in major public projects in Scotland include: Battle of Bannockburn Visitor Centre (Chinese granite), estimated value £250k; The Kelpies (Chinese granite) £1 million; Dundee Waterfront (Chinese granite) £4 million; Edinburgh Trams project (Chinese granite) £1 million; Helensburgh streetscape improvements (Chinese granite) £1 million; Raploch Urban Regeneration Project (Chinese granite) £750k; Wishaw town centre regeneration (Mongolian basalt) £300k; Oban waterfront regeneration (Chinese granite) £500k; Fort William town centre regeneration (Portuguese granite) £250k; Inverness shopping district (Chinese granite) £1 million; Kinross High Street regeneration (stone from Italy and Portugal) £250k; Scottish Parliament Building (South African & Portuguese granite) £2 million. The above information was supplied by Peter Stewart.

[6] Statements relevant to the stone industry are presented under two headings: 'Minerals' and 'Built Environment'; within the latter section relevant policy is presented under the headings 'New Build' and 'Conservation'.

- The significance attached to building stone appears to have diminished over time in some parts of the SPP. For example, paragraph 228 (under the heading 'Minerals') of the 2010 version of SPP contained the following detailed statement relating to dimension stone and slate (i.e. building stone), which is omitted from the current (2014) version: "Dimension stone and slate are important for repair of existing buildings and as a new building material. The demand for and scarcity of consented reserves of building stone means that reserves should be safeguarded in development plans. Reopening dormant and securing active sites is important in providing for future supply. As building stone reserves are often worked on small sites, in limited quantities and intermittently, planning authorities should ensure that conditions do not impose undue restrictions on such operations ... Planning authorities should also facilitate the recycling and re-use of material in waste tips and construction and demolition wastes at appropriate general industrial locations or minerals sites."
- None of the policy statements in the current version of SPP encourages the use of 'original stone' or 'local stone', or even building stone, in either repairs to traditional/historic buildings or in new buildings. Instead, rather vague statements are made that can be interpreted in a number of ways, for example "The ... materials ... of any development which will affect a listed building or its setting should be appropriate to the character and appearance of the building and setting".
- SPP (paragraph 236) encourages planning authorities to produce 'strategic development plans' that ensure "adequate supplies of construction aggregates can be made available from within the plan area to meet likely development needs", but an equivalent statement for building stone is not made.
- Creating Places, the Scottish Government's policy statement on architecture and place (published in 2013), contains the following two statements that appear to provide strong (though still essentially aspirational) support for locally sourced stone: "project clients, commissioners, designers and approvers should encourage design innovation and take advantage of locally-sourced materials to facilitate sustainable development" (Article 4); and "we will continue to work to ensure that the appropriate skills and materials are available to conserve, repair and maintain our existing buildings, so that they continue to contribute to the low carbon economy" (Article 4.3).
- A review of all relevant planning authority policy in Scotland is beyond the scope of this study, but a comparison of the current local plans issued by Moray Council (2015) Aberdeen Council (2012), Falkirk Council (2015) and Loch Lomond & The Trossachs National Park (2010-2015) reveals some differences in approach and emphasis, for example: policy statements regarding building stone extraction, reserves and resources appear in all plans except the Aberdeen one; only the Moray Council Local Plan includes a policy statement regarding the safeguarding of building stone (Policy ER3); only Loch Lomond & The Trossachs National Park Plan highlights some of the key issues associated with the lack of availability of local building stones (Policy MIN1: "the shortage of locally sourced building materials is eroding the historic character of traditional buildings and conservation areas in the Park and requiring the transportation of materials from outside of the Park"); none of the plans mention future building stone needs; all plans contain policy statements regarding the use of 'materials' in building alterations and extensions, new build and listed buildings, but none mention building stone (or dimension stone) specifically; the Aberdeen plan recognises the importance of conserving the granite heritage of the city (Policy 3.25), and encourages the re-use of granite from demolished buildings (Policy D4), but significantly it makes no mention of the possibility or desirability of using the original, local Aberdeen granite (or an alternative local stone, such as Kemnay granite which is of similar appearance and still being quarried near the city today).

- Although Scottish Government and planning authority policy statements in general support the protection, extraction and use of local building stone, the policy objectives are essentially aspirational (unlike EU Procurement Directive 2014/24/EU, which is a legal requirement) and the wording generally allows a considerable amount of freedom in the way that policy is interpreted and implemented.
- A review of the extent to which recent and current policy has been effective in encouraging planning authorities and other stakeholders to safeguard important resources and to promote the extraction and use of local building stone is beyond the scope of this study, but empirical and anecdotal evidence suggests it has been relatively ineffective.
- A review of the extent to which policy relating to other topics (e.g. environmental protection) is taking precedence over policy relating to building stone is beyond the scope of this study, but would provide useful information about the way planning authorities approach and prioritise building stone issues.

4 The future: can the Scottish stone industry rise again?

This section of the report provides an evaluation of the potential for growth in the Scottish stone industry, a brief consideration of available resources, a summary of the benefits a bigger industry could bring, an assessment of the barriers to growth, and some proposed actions.

4.1 IS THERE SUFFICIENT DEMAND TO SUPPORT INDUSTRY EXPANSION?

There are several reasons to believe that the potential demand for Scottish building stone is substantially bigger than the current demand, and that demand could continue to grow for the foreseeable future.

The current demand for stone in Scotland (estimated to be roughly 290,000 tonnes annually [see section 3.2], of which less than one tenth is produced in Scotland) comes from three main sources.

- *Repairs to existing stone-built structures*

  Scotland has approximately 450,000 traditional (pre-1919) buildings, nearly all of which are constructed of stone, and a huge number of other stone structures such as boundary walls, monuments, bridges, engineering supports and paved surfaces; there is no published estimate of the total number of stone-built structures in the country, but it might easily exceed two million. A significant proportion of those stone-built structures currently need some form of stonework repair that requires replacement stone[7]. The scale of the problem was highlighted in HEACS (2006). If in future just 1% of stone-built structures undergo stone repair annually, that could equate to 20,000 projects that would need stone every year. A substantial and broadly reliable future demand for stone therefore is guaranteed simply by the size of the ageing built heritage.

- *Construction of modern buildings*

  Recent decades have seen a significant increase in the use of natural stone in modern buildings, particularly in the form of cladding panels on commercial buildings and walling blocks for dwelling houses. Part of this trend will be due to the ongoing

[7] The size of this 'traditional materials' problem is illustrated in several publications.

A survey (commissioned by Scottish Stone Liaison Group, Scottish Enterprise and Glasgow City Council) of roughly 230 sandstone buildings in Glasgow was conducted in 2005 (Hyslop et al., 2006). The buildings were selected to represent the range of sandstone structures in the city (tenements, villas, ecclesiastical, commercial and civic buildings etc). When extrapolated to reveal building repair requirements across the city in the twenty years following the survey, the results indicated that 97% of buildings were in need repair and ~390,000 tonnes of stone would be required to repair building facades, 38% of which (149,000 tonnes) is stone for which no suitable replacement is currently available in Scotland (putting at risk the long-term health of many historic buildings in the city).

'Scottish House Condition Survey 2014' reported that 73% of dwellings in Scotland have some level of disrepair and that older dwellings are more susceptible to deterioration, with 72% of those built before 1919 having instances of 'critical' disrepair.

The report 'Scottish Small Towns Report 2007-2013' indicated that in the Scottish Borders (for example) "every town surveyed had instance of serious disrepair" and that approximately 70% of surveyed properties would benefit from, or require, works to remove serious defects.

The report 'Traditional Building Craft Skills – Assessing the need – Meeting the challenge' by the National Heritage Training Group (2007) reported that there were 446,000 traditionally constructed buildings (i.e. pre-1919) in Scotland, with an approximate spend on repair and maintenance of £1.2 billion *per annum* (the report concluded this was "insufficient to ensure survival of Scotland's built heritage"); the report indicated that 4,740 additional workers would be required between 2007 and 2010 to meet demand.

development of cladding technologies and growing availability of cheap (often imported) stone cladding panels, but it also reflects a growing desire and willingness amongst architects and planners to reference and respect local building heritage. Natural stone is also becoming a more popular material to use in flooring, worktops, fireplaces and other decorative features (e.g. Natural Stone Specialist, 2015).

- *Re-instatement of traditional public realm*

  Recent decades have seen considerable efforts to improve the public realm in settlements all over Scotland, typically including the renewal of paved areas using traditional materials such as natural stone flags, setts and kerbs. A considerable amount of public money has been invested in the public realm by local authorities and through restoration and regeneration projects (e.g. the Historic Scotland *Conservation Area Regeneration Scheme* and the Heritage Lottery Fund *Townscape Heritage Initiative*), and some planning authorities now require as a condition of planning consent that private developers of buildings improve adjacent public realm.

An increase in the demand for Scottish stone could come from several sources.

- *A growing need to repair existing buildings (put another way, an overall decline in the condition of traditional buildings)*

  The number of stone structures in need of repair is likely to grow in future. This is in part simply a consequence of the building stock continuing to age, but it is also an inevitable consequence of widespread poor practice in stonework maintenance, which continues to be a major problem. Contributory factors include the legacy of aggressive stone cleaning methods that were applied to numerous buildings in the 1980s and 1990s, the widespread use of replacement stone and mortar that are incompatible with the original stone (leading to accelerated stone decay), and a common tendency for building owners to ignore stone decay and defective rain-shedding measures. Sandstone, which is the dominant building stone in Scotland, is particularly prone to decay if poorly maintained.

- *Other parts of the UK*

  Scotland currently imports a substantial amount of stone from other parts of the UK (principally England), and there is no obvious reason why Scottish stone could not be sold to the rest of the UK in much greater quantity than it is currently provided it is marketed appropriately.

- *Overseas*

  Caithness Flagstone currently is the only Scottish building stone that is sold in significant volume to customers outside the UK (Table 2); the physical qualities of this stone (which is durable and particularly suited to paving), together with a global reputation and legacy of use overseas, make it attractive to overseas customers. Most other Scottish stone is unlikely to attract a significant demand from overseas on the basis of the criteria that are usually used to market stone, such as aesthetic appeal, performance capability and cost, and the product probably would need to be promoted on the basis of other selling points that 'set it apart from the crowd'. Perhaps the most obvious criterion for the industry as a whole is the fact that Scotland has (together with other parts of the UK) perhaps the richest legacy of natural stone use of any country in the world. This pedigree clearly sets Scotland apart from many of the countries that currently dominate the global trade in stone (e.g. China, India, Brazil) and, presented in the right way (perhaps allied to the established international image of Scotland as a rugged country steeped in history), could contribute to a powerful marketing image for Scottish stone. The fact that nearly all Scottish building stones have a track record of use over many decades (or even centuries)

is another potential selling point that sets Scottish stone apart from many stones currently provided by overseas suppliers.

- *Greater awareness of the benefits of using natural stone, in particular Scottish stone*

  A growing number of organisations in Scotland [e.g. British Geological Survey, Building Environment Forum Scotland, Historic Environment Scotland, National Trust for Scotland, Scottish Traditional Building Forum] now recognise the problems associated with poor building maintenance and the benefits of using natural stone, and Scottish stone in particular. As a result, public awareness and appreciation of the issues is beginning to grow; in time, and if the momentum achieved so far continues to build, this should translate into increased demand for Scottish stone.

- *Greater use of indigenous stone instead of imported stone*

  In geological, geotechnical and aesthetic terms, there is nothing inherently distinctive or unique about most of the stone that is imported into Scotland, and in most cases building stone sourced in Scotland could provide perfectly adequate substitutes. Scottish building stone accounts for approximately one tenth (c. 27,000 tonnes) of all the stone that is currently used in Scotland annually (c. 260,000 tonnes), so currently the *potential* market for indigenous stone in Scotland (assuming indigenous stone was used instead of imported stone) is around ten times the amount of stone produced in-country today.

4.2 DO WE HAVE THE RESOURCES TO SUPPORT INDUSTRY EXPANSION?

4.2.1 Geological resources

4.2.1.1 RANGE OF BUILDING STONES

For its size, Scotland is one of the most geologically diverse countries on Earth. Many thousands of individual bedrock units are mapped, representing all periods of Earth history as far back as three billion years ago and encompassing nearly every type of rock. Across the country the character of the bedrock geology changes every few miles, which is why the character of the built environment changes from place to place and is often locally distinctive. The geological diversity means that Scotland has numerous outcrops of most of the rock types that are sought after as building stone, including sandstone, flagstone, slate, granite and whin; the only notable exceptions are limestone and marble, both of which have been quarried for building stone in Scotland but not in great abundance. For each of these broad types of stone there are numerous varieties; for example, in different parts of Scotland there are white, buff, brown and orange sandstones, brown, grey and purple flagstones, slates of different character, and a wide range of texturally variable grey and pink granites.

In all, roughly 200 distinct building stones are recognised[8], each of which comes from a particular stratum of sedimentary rock or intrusion of igneous rock. The character and geographical extent of these bedrock units in general terms is well understood, and maps and reports published by BGS provide much of the basic information required to identify areas within which new resources of each building stone *may* be found.

As demonstrated by the historical building stone industry, in geological terms Scotland has the potential to produce a very wide range of building stones.

[8] These are recorded in the BGS 'Index of Scottish Building Stones', which has been compiled as part of an ongoing collaborative effort by BGS and Historic Environment Scotland to create a Building Stone Database for Scotland.

4.2.1.2 RESOURCES AND RESERVES

In the field of mineral exploration, unexploited mineral occurrences (including building stone) typically are considered in two categories: a *resource* is known to be potentially valuable and has a reasonable prospect of eventual economic extraction, whereas a *reserve* is that part of a resource that has been fully evaluated and is deemed commercially viable to work. In a further refinement of the latter category, a *permitted reserve* is a reserve with established legal access and for which a valid planning permission for extraction also exists. In these terms, Scotland probably can be said to have large building stone resources (though little work has been done to define the extent of these) but practically no reserves beyond those that currently are being worked.

To become a permitted reserve a building stone resource needs to be geologically suitable, it must be accessible, and it must have planning permission.

To be considered geologically suitable a resource needs to be:

- comprised of a stone with desirable appearance and geotechnical properties
- of consistent character
- sufficiently extensive (laterally and/or vertically) to be commercially viable
- not adversely affected by fractures, including geological faults and joints.

These requirements mean that many of the best building stone resources may be highly localised and difficult to identify and characterise.

Poor accessibility can prevent building stone resources from becoming reserves. Some geological factors, such as a thick overburden or shallow water table, can restrict accessibility, and some of Scotland's historical building stone quarries are no longer accessible as a result of infilling, flooding or encroaching development.

In any part of the country (and particularly in highly sensitive areas such as national parks) planning permission to extract building stone may be denied for a range of reasons, many of which relate to environmental impact.

For these reasons, it is not possible to predict with any accuracy the size and location of building stone resources in Scotland without conducting a fairly detailed assessment. However, the history of the building stone industry in Scotland can provide a useful indication of the size and location of potential reserves. The demise of the building stone industry in the late 19th and early 20th centuries was due mainly to economic, social and cultural factors (rising costs, changing tastes, availability of cheap modern materials, war), not because the building stone quarries were exhausted (though that may have been the case locally). It therefore is reasonable to assume that good building stone resources are still available around many historical quarries, and where these are still accessible it should be possible to renew building stone extraction once the weathered rock, spoil and overburden have been removed.

Quarries typically are sited where bedrock is exposed and can be examined, but the vast majority of Scotland's land surface (more than 99%) consists of overburden (soil, peat, glacier deposits, vegetation, human construction etc) that conceals the bedrock. Very large amounts of stone that would make good building stone probably are concealed beneath the overburden, but in general it probably would require considerable cost and effort (clearing of overburden or coring) to pinpoint and characterise good resources. This approach may be viable where there is good reason to think that an historically significant or commercially valuable stone exists beneath the overburden in a location with no access restrictions, but is likely to be impractical in most places. In general terms, therefore, much of the potential for increasing the quantity and variety of building stone produced in Scotland is likely to be met by expanding currently active quarries and re-opening historical quarries.

4.2.2 Knowledge and skills

The extraction and processing of raw stone into building material requires a high level of knowledge and skill based upon a thorough understanding of local geology, stone characteristics and how the material performs in use. Much of this knowledge and skill, which had been developed over centuries, was by the time of the industry's peak in great demand across the globe. A natural consequence of the industry's subsequent decline has been gradual loss of expertise, as skilled practitioners have had to move into other areas of employment or have retired from the quarrying industry. The number of stonemasons being trained in the past few years has stabilised; however, whereas this craft includes elements that are relevant to the processing of stone into architectural units, it does not include building stone quarrying techniques. Building stone quarrying requires some skills that are employed in other extractive industries, such as the use of heavy machinery and saws. However, the more specialist and nuanced knowledge and skills that are required to understand and work with the geology to extract block for processing into dimensional stone are now quite rare, and any increase in the output of the Scottish building stone industry would have to be accompanied by additional training and upskilling to fill a skills gap.

4.3 HOW WOULD SCOTLAND BENEFIT FROM A BIGGER INDIGENOUS BUILDING STONE INDUSTRY?

A number of important benefits to Scotland could result from a bigger, stronger indigenous stone industry.

4.3.1 Economic, social and cultural benefit

Calculated on a *pro rata* basis, roughly 1,600 jobs would be created if all the stone currently imported into Scotland was produced by the Scottish stone industry[9]. Further jobs would result from any increase in exports or in the overall home-grown demand for stone (if that demand was allied to a preference for Scottish stone rather than imported stone). As with other commercial sectors, any new jobs in the stone industry would have a multiplier effect on indirect jobs and spending, bringing additional benefits to local economies.

Most new jobs created in the building stone industry would be skilled and many would be in rural areas. Importantly, because stone is a geographically widespread resource in Scotland there is potential to re-open old quarries or establish new quarries near rural communities and in economically deprived areas, bringing disproportionately large benefits on a local scale.

Greater use of natural stone in Scotland could bring a range of less tangible social, cultural and economic benefits. The character of the local stone plays an important role in the building style and general 'sense of place' in most of the villages, towns and even cities in Scotland, so the fact that imported stones and man-made materials are now used so extensively in repair, new-build and regeneration projects means the visual consistency of the historical stonework is being lost and the distinctive character of many settlements is being diluted. Scotland's built heritage is a valuable national asset that is attractive to locals and visitors alike, and the dilution of 'sense of place' is likely to have adverse cultural, social and economic consequences. Greater use of stone, in particular local stone, would help to strengthen the 'sense of place' and the cultural/historical identity of settlements, which have been shown to improve community wellbeing (e.g. Butterworth, 2000) and simultaneously would strengthen the positive perceptions of visitors, thereby potentially bringing economic benefit through increased tourism.

[9] This is based on the following figures from section 3.2: the Scottish stone industry currently produces roughly one tenth of the stone used in Scotland annually, and roughly 160 people currently are employed in the building stone industry.

4.3.2 Benefit to the built environment

The many thousands of buildings and other structures that make up Scotland's stone-built heritage were constructed using stone sourced from thousands of quarries, many of which supplied stone to a local market only. Today only a tiny fraction of those quarries are active, with the consequence that it usually is not possible to use the original stone in building repairs; instead, a different stone must be used. This greatly increases the possibility that the original stone and the new stone will be geologically incompatible, which can result in additional damage to the remaining original stone. A substantial proportion of Scotland's stone buildings already suffer to some degree from decaying stonework, so the fact that additional damage commonly results from repairs because incompatible stone (or mortar) is being used is a cause for significant concern. Providing new supplies of some of Scotland's traditional building stones (by either re-opening historical quarries or opening new quarries within the outcrops of traditional building stones), particularly those stones that have high heritage value, would bring significant benefit to the long-term health of affected buildings.

4.3.3 Benefit to the natural environment

Natural stone generally performs very well in a range of criteria employed in the *Green Guide to Specification* (http://www.thegreenguide.org.uk/), which was developed by Building Research Establishment (BRE) and provides online access to information about the environmental performance and impact of various construction materials throughout their 'cradle to grave' life cycle. Stone is a durable, long-lasting material with opportunities for re-use and recycling, and it takes less energy to produce stone than all other common construction materials: expressed as embodied carbon (which reflects the CO_2 emissions arising from the production and distribution of the material), granite and sandstone require less than half the energy of concrete and brick, around a quarter of the energy needed for timber, and around one seventeenth of that needed for steel (Figure 5). Slate has higher embodied carbon than other building stones (Figure 5 and Figure 6[10]), roughly similar to that of brick, because the waste ratio is much higher (typically around 85%).

Stone is a heavy commodity, so transporting large volumes by sea, rail or road comes at a significant environmental cost. Stone imported from distant countries like China, India and Brazil can still be cheaper to buy in the UK than locally quarried stone, because of relatively low labour costs and overheads in those countries, and the economies of scale that big operations can bring to bear; however, the relatively low cost of imported stone at point-of-sale in the UK obscures the significant environmental cost of transporting such a heavy commodity over long distances. Sandstone imported into the UK from China has roughly six times as much embodied carbon as sandstone sourced in the UK (Figure 7).

Most of the English stone that is used in Scotland comes from quarries in the northern half of the country, so the distance stone must be transported to reach Scottish users is small compared to some of the stone imported from overseas; nevertheless, English stone forms a substantial proportion of all the stone that is imported into Scotland, and cumulatively this represents a substantial quantity of embodied carbon that could be reduced significantly if the stone was sourced in Scotland.

[10] The values for building stones in figures 5 and 6 were produced by different studies, probably using different criteria; this may explain why the values are not the same in the two figures.

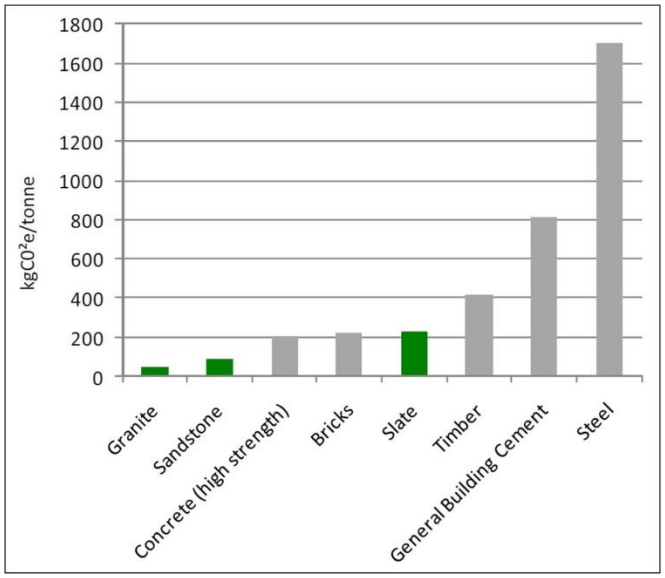


Figure 5 Embodied carbon in common construction materials (from SFGB, 2011)

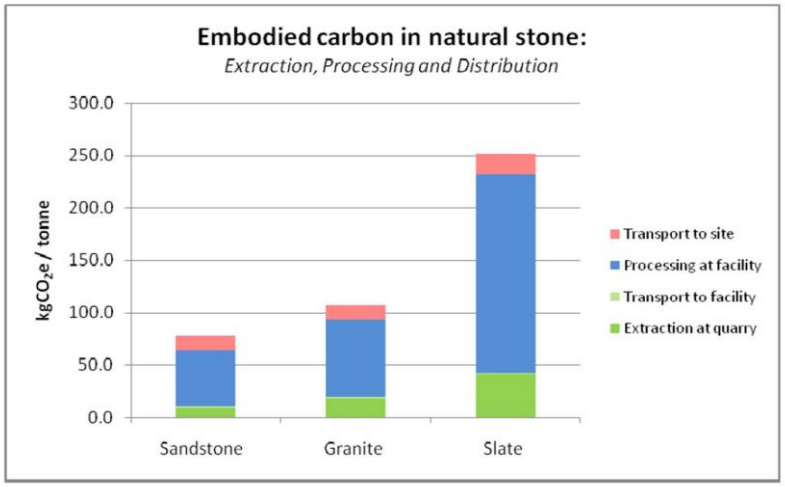


Figure 6 Embodied carbon in UK-sourced building stone (from Crishna et al., 2010)

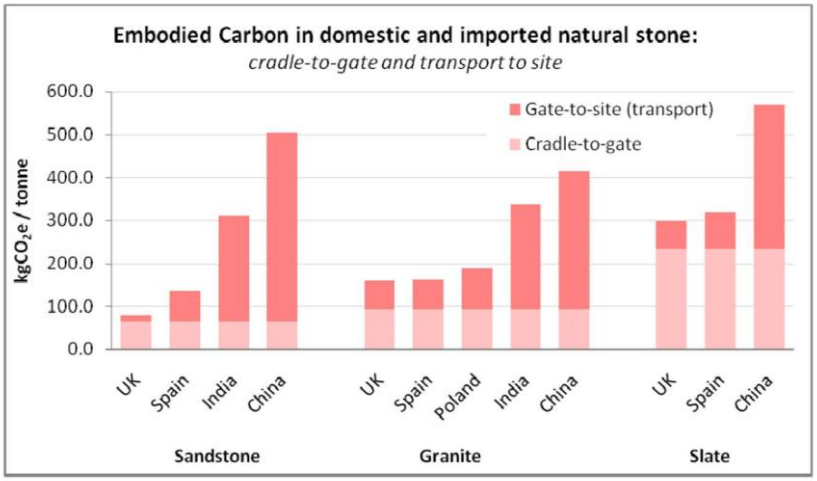


Figure 7 Embodied carbon in imported stone (from Crishna et al., 2010)

4.4 WHAT ARE THE BARRIERS TO GROWTH, AND WHAT SOLUTIONS MIGHT BE CONSIDERED?

Judged by the size of the demand for stone, the range and volume of indigenous stone resources, and the generally supportive policy environment, there clearly is potential for the stone industry in Scotland to grow substantially. However, the same conclusion was reached in each of two previous published reviews, in 1980 and 1997, yet little substantive and lasting progress has been made in the intervening period. Clearly, whatever issues are preventing the industry from growing have not been overcome successfully to date. In this section of the report we describe what we perceive to be the main barriers to growth, and propose some actions that might provide solutions. The contents are based on a re-assessment of the conclusions in the two previous reviews, a brief consultation with quarry operators and other stakeholders for this review, and our own observations.

4.4.1 Barriers

The issues identified below are divided into those that mainly affect the 'supply side' (quarrying) and the 'demand side' (specifying) of the building stone industry.

Supply side barriers

- The small scale of Scottish quarrying operations, intermittent demand, relatively high overheads (e.g. costs incurred in obtaining planning permission and meeting employer responsibilities), and in some cases restrictive planning conditions, make it difficult for indigenous stone to compete with imported stone in terms of cost, visibility, product range, lead-in time, and ability to meet large or unusual orders.
- Quarry operators are discouraged from investing in new or expanded quarry operations because of insufficient information about building stone resources / reserves and potential markets for new building stones.
- A generally negative public perception of quarries and quarrying can make it difficult to obtain planning permission to open, re-open or expand quarries.
- Planning applications for new or expanded building stone quarries are perceived by applicants to be at significant risk of rejection, in part because planning authorities generally do not consider the 'development need' for building stone in their area development plans.
- Few people in Scotland have the knowledge and skill-set required to find and extract building stone efficiently and cost-effectively. Inexperienced quarriers (e.g. farmers keen to diversify by opening or re-opening a quarry on their land) are more likely to encounter problems, and possibly fail, because they lack the necessary knowledge and skills (and in some cases the equipment), and currently the information and advice they need are not readily available.
- A substantial amount of offcut and rubble can accumulate from the preparation of some building stone products; this low value material can be difficult to sell, move or dispose of, and can reduce profitability. Planning restrictions on end-uses of quarried material can exacerbate this problem.

Demand-side barriers

- The positive attributes of stone as a building material, including low embodied carbon during production, durability, insulating properties, aesthetic qualities, and recyclability, commonly are overlooked or ignored in favour of other building materials.
- The contribution indigenous stone can make to sustainable development in Scotland, including low embodied carbon during production *and* transport, support for local jobs and skills, and contribution to local character / sense of place, commonly is overlooked or ignored in favour of imported stone.
- Lack of awareness among the general public of the history and tradition of the Scottish stone industry, and the various benefits of using Scottish stone, means they generally do not demand Scottish stone.
- Specifiers commonly are not aware of the range of available Scottish building stones.
- Specifiers commonly are not aware of the importance of using compatible stone in traditional building repairs and therefore are less likely to attempt to source more of the original stone.
- Building stone produced in Scotland commonly is more expensive at point-of-sale than equivalent imported stone, so Scottish stone typically is not specified when cost is a key selection criterion.
- Uncertainties over the way EU Procurement Directive '2014/24/EU on public contracts' should be interpreted means that specifiers are reluctant to specify Scottish stone for new construction in public projects (see section 3.4).
- There is a perception amongst specifiers that lead-in times for Scottish stone are longer than for imported stone, and that local operators can't supply the quantities of stone required for large projects[11]. While this certainly is not the case in all situations, planning restrictions and the intermittent nature of demand limit the extent to which Scottish stone producers and suppliers are able or willing to stockpile large quantities of stone in anticipation of orders. This means stone must usually be quarried to order, which can lengthen lead-in times.
- Increasingly, specifiers demand stone that has uniform character and can be produced in regular block dimensions (ignoring the fact that it is a natural, and therefore inherently variable, material, which arguably is a key part of its attractiveness in traditional buildings); in general, this favours imports.
- Those specifiers that do want to use the original, local stone in a repair or new-build project usually find that it is not commercially available, and understandably they usually are not prepared to take on the trouble and expense of re-opening an historic quarry to support a single project[12]. This is perhaps the principal reason why the various policy statements that encourage the use of local stone (see examples in Table 2) have had little positive impact.

[11] The redevelopment of the St James Centre in Edinburgh is an example of a recent project in which this issue and several other 'demand-side' barriers were to the fore; see http://www.edinburghnews.scotsman.com/life-style/will-st-james-plans-ever-be-set-in-stone-1-3816680 and http://www.edinburghnews.scotsman.com/news/st-james-development-gets-go-ahead-from-councillors-1-3818052.

[12] Liddles quarry on Orkney, which was re-opened by Orkney Islands Council in 2010 specifically to provide stone to use in the Stromness Townscape Heritage Initiative, is a notable exception. A preliminary project was required to identify Liddles quarry as the source of the original flagstones used in Stromness.

4.4.2 Proposed actions

The issues listed above are to some extent interconnected, and none of them has a simple, single solution. Some of the following proposals could make a contribution, but a more thorough and carefully considered approach than is possible here will be needed.

4.4.2.1 IMPROVING THE EFFICIENCY AND PRODUCTIVITY OF QUARRY OPERATIONS

Scottish building stone quarries will need to maximise operational efficiency and productivity if they are to compete more effectively with imported stone on issues such as cost and lead-in time. This might be achieved through greater exchange of knowledge, skills and experience with peers (and any broadly analogous industries) in Scotland, elsewhere in the UK, and overseas, and through greater co-operation between quarry operators (e.g. a more 'co-operative' approach to the use of equipment and personnel).

A guide to opening / re-opening / operating / remediating building stone quarries, ideally covering regulatory and planning issues, resource assessment and geological issues, operational issues, marketing, media and public engagement, health & safety, accounting, costs and useful contacts, could encourage new quarry operators to invest and might help them to succeed.

A scheme to bring together experienced quarry operators (who may wish to expand their business but lack access to building stone resources) and inexperienced quarry operators (who may have access to a building stone resource but lack the knowledge / experience / equipment to exploit it efficiently) could help to increase the number of new quarrying operations and improve the success rate of inexperienced operators. The scheme could aim to develop two types of relationship: mentor-mentee relationships that focus on knowledge transfer and are of particular benefit to the less experienced party; and formal business relationships whereby the experienced operator participates in the quarrying activity, to the mutual financial benefit of both parties.

These initiatives would need to be industry led.

4.4.2.2 RAISING AWARENESS OF THE ENVIRONMENTAL COST OF IMPORTED STONE

Cheaper labour and other production costs, together with economies of scale, mean that stone imported from outwith the European Union commonly is cheaper than Scottish stone at point-of-sale in the UK. However, this conceals the considerable environmental cost of transporting large volumes of stone over very long distances, and raising awareness of the comparative environmental cost of imported and indigenous stone may encourage more specifiers to select local stone; this would have the additional benefit of helping Scottish Government achieve its target of reduced greenhouse gas emissions by the end of this decade[13]. Ideally, this would be addressed in two ways: (i) by making details of the 'carbon cost' of different stones available on stone supplier's websites and in other marketing materials (a colour-coded system could be introduced, such as that used to display the energy efficiency of white goods), so that specifiers can easily make comparisons; and (ii) by encouraging Scottish Government and planning authorities to take into account (subject to EU regulation) environmental cost when awarding contracts and considering planning applications. The methodology and some of the information needed to prepare comparative figures for embodied energy / carbon cost in indigenous and imported stones are already available (e.g. Crishna et al., 2010).

This initiative would need to be industry led, but might attract support from Scottish Enterprise.

[13] A March 2015 article in The Guardian newspaper highlighted the extent to which Scotland relies (increasingly) on imported goods, and the degree to which that is affecting the Scottish Government's attempts to secure a low carbon economy and achieve legally binding emissions targets: http://www.theguardian.com/uk-news/scotland-blog/2015/mar/18/scotlands-carbon-footprint-grew-53-in-a-year-report-finds.

4.4.2.3 IMPROVING PUBLIC ATTITUDE TOWARDS BUILDING STONE QUARRYING

The Scottish public in general does not distinguish between different forms of quarrying, so building stone quarries suffer from the same public perception that applies to quarrying generally. However, quarrying for building stone typically is conducted on a relatively small scale using environmentally friendly extraction methods that do not include blasting and crushing, and as such lacks much of the dust, noise, pollution, visual intrusion, increased road traffic and other negative impacts that the public associates with quarrying generally. A positive public perception of building stone quarrying should make it easier to obtain planning approval to expand, re-open or open building stone quarries, and any steps taken to improve public perception simultaneously should help to raise public awareness of the presence and benefits of the indigenous building stone industry.

Much of the responsibility for engineering such a change must rest with the building stone industry.

Possible approaches include the following.

- Using a range of media channels to emphasise the relatively small environmental impact of building stone quarrying, the economic, social and environmental benefits that it brings, and the 'localness' of these benefits.
- Introducing a 'Code of practice for building stone quarrying' that pre-empts and allays public fears, and means all operations follow, and are able to demonstrate, good practice. Identifying quarrying operations that can be held up as exemplars in planning applications and similar situations could form a part of this process. The criteria for a code of practice could include measures to: minimise all forms of environmental impact and waste; inform and engage the public (for example by providing a clear justification for the quarrying activity and describing the benefits); and provide a 'whole-life' plan for a building stone quarry (including site remediation).

4.4.2.4 MAKING AVAILABLE INFORMATION ABOUT BUILDING STONE RESOURCES IN SCOTLAND, AND POTENTIAL MARKETS

Currently, there is little published or publicly available information about building stone resources and potential markets for building stone that can help stakeholders (such as quarry operators considering whether to expand or create a quarry, and planning authorities considering whether to approve a quarrying application or safeguard a quarry) make informed decisions.

The following actions could be considered.

- Create a list of Scottish building stones that have significant heritage value (e.g. those that make a major contribution to local character, or were used in important historic buildings, or were used extensively in different parts of the country). Such stones should be recognised officially (perhaps by Historic Environment Scotland) as 'heritage stones' and the quarries they came from as 'heritage quarries'. This information, together with details of the extant buildings in which they appear, and whether or not the original quarries are still accessible, would be made generally available. This initiative could be led by BGS and Historic Environment Scotland, using information held in the Building Stone Database for Scotland which they are developing jointly.[14]

[14] Essentially the same recommendation for England and Wales was made in 'The Symonds Report' (Thompson et al., 2004). The Strategic Stone Study (SSS), an initiative co-funded by Historic England (formerly English Heritage) and BGS (see http://www.bgs.ac.uk/mineralsUK/buildingStones/StrategicStoneStudy/EH_project.html), was established as a result of this report. The SSS has the aim of creating a database of the building stones of England and Wales from which 'heritage quarries' can be identified and protected.

- Identify and delineate Scottish building stone resources that have the potential to become reserves. This could, initially at least, focus on those building stones that are considered to have the greatest heritage value (see previous point) but are not currently available. The initiative probably would need to be funded by industry (perhaps with support from Scottish Enterprise), though the resource evaluation would require appropriate geological expertise (e.g. BGS or private consultant).

4.4.2.5 IMPROVING PUBLIC AWARENESS OF INDIGENOUS STONE AND ITS BENEFITS

The objectives would be to improve public and practitioner awareness and interest in all aspects of the industry, re-instate a sense of national pride in our stone-built legacy, raise interest in the current and future potential of indigenous stone, address misconceptions about quarrying impacts and the relative expense of stone, and encourage specifiers to incorporate and celebrate the natural variability of stone in buildings; the result should be an increased demand for Scottish stone.

A range of initiatives involving different stakeholders and media channels would need to be used. One important component will be The Engine Shed, which is being developed in Stirling by Historic Environment Scotland; this converted historic building will house Scotland's first dedicated building conservation centre, and when it opens to the public in 2016 it will be a visitor attraction as well as a centre for learning and training.

4.4.2.6 IMPROVING SPECIFIER AWARENESS OF, AND ATTITUDE TOWARDS, INDIGENOUS STONE

Poor awareness amongst specifiers (architects, contractors etc) of the availability and benefits of Scottish building stones is identified in several of the demand-side barriers listed above. Better marketing of Scottish stone would help to address the issue, but a greater level of interaction between stone specifiers and stone producers (perhaps through CPD events or workshops) could help to raise awareness of the issues and constraints faced by both groups, and could foster a greater willingness to work together.

This initiative would need to be industry led, perhaps with support from professional organisations representing specifiers (e.g. RIAS, RICS and Construction Scotland).

4.4.2.7 IMPROVING THE EFFECTIVENESS AND REACH OF MARKETING

Currently, Scottish building stone is marketed almost exclusively by individual quarry operators and other stone suppliers, primarily through their own websites. As a result, some marketing effort is effectively duplicated by every supplier and it is difficult for any one supplier to create a highly effective marketing strategy. At the same time the industry has little collective profile in and beyond Scotland (including little or no representation at stone trade events outside Scotland), and it is difficult for any specifier (or other interested party) to get a sense of the full range, properties and availability of Scottish stone.

A more effective marketing strategy is needed if the industry as a whole is to grow significantly, and especially if it is to compete more effectively with imported stone. The best way to achieve this will need to be considered carefully by the industry, preferably with professional marketing advice. However, it would seem to make sense for such a small industry to have a more co-ordinated approach to at least some aspects of marketing, through which each individual party would benefit from pooled ideas, shared costs and the raised profile of the industry as a whole. With this in mind, a single, co-ordinated marketing portal (a 'one-stop-shop') for Scottish stone could be developed, perhaps in association with a promotional scheme. The portal could include (or link to) an 'inventory of available Scottish stone' that ideally would include details such as the name/source, volume/tonnage, location and finish (e.g. sawn block, rough block, offcut, rubble) of all the building stone produced in Scottish quarries that is 'ready to sell' or could quickly be made available; this information should be useful to specifiers, and it may help

quarriers sell a bigger proportion of lower value stone (e.g. offcuts and rubble) thereby reducing waste.

A review of the stone industry in other countries could be helpful in revealing new ways to promote Scottish stone more effectively. Ideally, the review would encompass countries in which the stone industry faces similar challenges to those in Scotland (e.g. Ireland, Italy, the Nordic countries), and for each country it should include assessments of how indigenous stone is promoted and the extent to which the industry has managed to work with (or around) the restrictions imposed by EU Procurement Directive 2014/24/EU (see section 3.4). Any such review could usefully be expanded to cover other related topics, such as how different national governments and local authorities support their indigenous stone industry, and how quarriers in other countries maximise productivity.

These initiatives would need to be industry led, but the range of economic and other benefits that a bigger Scottish stone industry would bring might attract support from Scottish Enterprise.

4.4.2.8 Convincing planning authorities to provide stronger support for indigenous stone

Perhaps the single most effective way to increase the overall demand for Scottish stone is to persuade planning authorities in Scotland to: (i) recognise the importance of using the original, local stone(s) in their areas in repairs to traditional buildings and in new constructions, and the associated benefits this would bring in terms of sustainable development; and (ii) use the planning system to put in place the conditions that will encourage quarriers to provide the stone and specifiers to demand it. To that end, steps should be taken to persuade planning authorities to: (i) include the most important local building stone(s) in assessments of development needs; (ii) safeguard the disused quarries that produced those stones (if they are still accessible); (iii) identify in their 'area development plan' areas where renewed or new working of those stones is likely to be acceptable during the life of the plan; (iv) ensure that existing and new quarrying operations for building stone are assured of a reasonable working duration (e.g. 10 years); (v) use the planning system to encourage the public to use local stone, for example by making it a condition that (within reason, and subject to EU restrictions) the original stone is used to repair or extend heritage buildings and prominent new buildings, and in general giving preference to projects that use local stone.

These steps would help to reduce the investment risk associated with a planning application to extend, open or re-open a quarry, and simultaneously would help to raise awareness of the local building stone legacy and the benefits that using local stone can bring. The quarrying industry should engage with the plan-making process in each planning authority area at an early stage. The Mineral Products Association (MPA) has stated recently (MPA 2015a) that it "looks forward to positive engagement with local planning authorities on the subject of future supplies of dimension stone"; MPA members in Scotland should ensure that their organisation provides strong support in this regard.

4.4.2.9 Implementing a joined-up, co-ordinated approach

Any one of the actions proposed above is unlikely to make a significant difference on its own, because each is to some extent dependent on the others. For example, there is no point in a planning authority making it a requirement to use local stone in repairs to traditional buildings if the stone is not available, and conversely there is little incentive for a quarry operator to bring a heritage stone back to the market if there is no ready demand. This 'catch-22' situation is perhaps the single biggest impediment to the development of a bigger, more successful building stone industry in Scotland.

Two things must happen if significant, sustainable growth in the Scottish stone industry is to be achieved: (i) the individual actions proposed above need to be implemented more-or-less simultaneously; and (ii) key stakeholders need to work together to develop a shared

understanding of the issues, devise common goals, and agree on a strategic course of action. With this in mind, the following steps could be considered.

- The stone industry in Scotland should take responsibility for, and play the lead role in, implementing many of the proposed actions and ensuring that there is overall a joined-up, co-ordinated approach. Individual quarry operators must be involved, but the trade associations for the stone industry - namely SFGB and MPA - should lead, ideally working in partnership.
- A workshop should be arranged with the aim of bringing together representatives of all the key stakeholder groups (e.g. Scottish Government, Scottish Enterprise, planning authorities, the Scottish quarrying industry, Construction Scotland, Construction Scotland Innovation Centre, Royal Incorporation of Architects in Scotland, Historic Environment Scotland, Heritage Lottery Fund Scotland, local history / conservation / heritage groups, British Geological Survey) to discuss the core issues, set up cross-group pairings, and agree on a strategic plan (with clear roles, objectives, timescales and [if appropriate] funding plans for different stakeholder groups). Ideally, a 'vision' for a much bigger Scottish stone industry, with all its associated benefits for the country and for individual stakeholders, would be set out in advance of the workshop.
- The strategic plan should involve stakeholders at all levels; for example, initiatives that are 'top-down' (e.g. development of stronger policy and other forms of support from Scottish Government and planning authorities) should be implemented simultaneously with others that are 'bottom-up' (e.g. getting local history / conservation / heritage groups to raise public awareness of the issues in their areas).
- The stone industry should try to persuade Scottish Government and Scottish planning authorities to introduce - as far as they are allowed by EU and UK rules - a combination of incentive ('carrots') and statute ('sticks') to encourage a bigger home-grown demand for Scottish stone. For example, the low embodied carbon of locally sourced stone (compared to imported stone) and the critical role played by local stone in conserving traditional buildings and preserving settlement character are just two of the arguments that could be used to promote the idea that local stone use should be incentivised financially (through tax relief, grants or subsidies) and/or in the planning system.
- The stone industry should try to persuade key stakeholders, including Scottish Enterprise and Scottish Funding Council (through the Construction Scotland Innovation Centre), to provide financial and other assistance with marketing, business development, and innovation in the development and provision of products, information, services and business.

5 Summary and conclusions

Scotland has one of the greatest legacies of building with natural stone of any country in the world. Hundreds of thousands of stone structures (probably more than any other country on a *per capita* basis) built over several millennia contribute to a remarkably rich built heritage, and endow all parts of the country with visually distinctive settlements and a strong sense of history. At its peak the building stone industry that produced the stone was one of the largest employers in Scotland, with thousands of people working in hundreds of quarries in every county. In all, more than 200 different building stones have been extracted from the geologically diverse bedrock of Scotland.

Today, the Scottish building stone industry is a small fraction of its former size, and is struggling to survive. Building stone is produced from fewer than twenty quarries by a workforce of around 160 people, and the industry provides just one-tenth of the stone that is used annually in-country. The remainder is imported (principally from England, China and India), and the proportion of imported stone used in Scotland continues to rise every year.

The international trade in natural stone has grown enormously in recent decades, and stone from many countries is now marketed at trade fairs, advertised extensively online, and sold by distributers throughout the UK. Specifiers in this country are presented with a wide choice of imported stones that are readily available and often relatively cheap compared to locally sourced stone.

Uncertainties over the way EU Procurement Directive '2014/24/EU on public contracts' should be interpreted, and reluctance amongst specifiers to risk a legal challenge from other stone suppliers or from the European Parliament, has resulted in a situation where (i) Scottish stone is virtually never specified for new construction in public projects and (ii) many recent publicly funded new construction projects in Scotland have used cheap stone imported from outwith the EU.

It therefore is not surprising that imported stone has become so popular, but its dominance of the Scottish market comes at a significant price.

- Most Scottish building stones, including many that are used widely in traditional buildings, are no longer available, forcing building owners to use stones other than the original stone in repairs and thereby putting at risk the long-term health of many heritage buildings.
- The widespread use of imported stone in new buildings and public realm works means the visual consistency and 'sense of place' that characterises many settlements with traditional stone-built structures is being diluted and diminished, with adverse consequences for community pride and wellbeing.
- The environmental cost (embodied carbon) of transporting huge quantities of stone from distant countries is substantial (but not reflected in the cost of stone at point-of-sale in the UK).
- Perhaps most significantly, Scotland does not benefit from the jobs and income that would accrue if its own abundant building stone resources were used instead of imported stone.

Despite the current fragile state of the stone industry in Scotland, and the considerable challenge posed by imported stone, a key conclusion of this review is that the potential exists for the Scottish stone industry to grow significantly in coming decades. This view is based on the following evidence.

- In geological terms there is nothing particularly unusual about much of the stone that currently is imported into Scotland, so a large increase in the demand for Scottish stone (theoretically up to nine times the current demand) could be generated if specifiers were persuaded to select Scottish stone rather than imported stone.
- The overall demand for natural stone – to repair ageing buildings, improve public realm, construct new buildings, and create decorative features – is growing, and is likely to continue growing for the foreseeable future. Two recently announced 'city deals' for Scotland could boost the home-grown demand for stone significantly in the next decade.
- Scotland still has abundant unquarried resources of many building stones, and the knowledge and skill required to extract and process them efficiently still exists.
- A growing number of conservation bodies and other organisations in Scotland recognise the benefits of using local stone, which is helping to improve awareness amongst specifiers and the general public.
- A political willingness to support the use of local stone is indicated by a generally supportive policy environment.

A bigger indigenous stone industry could bring multiple benefits for Scotland, including:

- new jobs and associated wealth, probably mainly in rural areas and potentially in some economically deprived areas;
- improvements in the long-term health of stone structures and in the character and attractiveness of settlements, with associated social, cultural and economic benefits;
- a smaller carbon footprint, which could help Scottish Government achieve its target of reduced greenhouse gas emissions.

A number of factors affecting both the 'supply' (quarrying) and 'demand' (specifying) side of the industry are identified as barriers to growth.

- Supply side barriers include:
    - high costs (making it difficult to compete with imported stone);
    - negative public perception of quarrying;
    - lack of information concerning building stone resources and reserves;
    - a reluctance to invest because planning authorities generally do not consider building stone needs in area development plans;
    - difficulty in obtaining planning consent to initiate or modify a quarrying operation.

- Demand-side barriers include:
    - the generally greater cost of Scottish building stone at point-of-sale than equivalent imported stone;
    - EU Procurement Directive 2014/24/EU (which has been mentioned earlier in this section);
    - poor awareness amongst specifiers and the public generally of the history and legacy of the stone industry in Scotland, the benefits of natural stone as a building

material, the importance of using compatible stone (ideally the original, local stone) in traditional building repairs, and the contribution indigenous stone can make to sustainable development;
    - a growing tendency for specifiers to favour stone that has uniform character and can be produced in regular block dimensions (which currently favours imports);
    - a perception amongst specifiers that lead-in times for Scottish stone are longer than for imported stone, and that local operators can't supply the quantities of stone required for large projects;
    - the lack of availability of nearly all of Scotland's traditional building stones, which means that even if specifiers want to use the original stone in a repair or new-build project they usually are unable to source the stone.

To help address these issues the stone industry and its trade associations in Scotland, with help from other stakeholders where appropriate, should take steps to:

- improve the efficiency and productivity of quarry operations;
- raise awareness of the environmental cost of imported stone;
- improve public attitude towards building stone quarrying;
- make available information about 'traditional' Scottish building stones (where they came from, where they were used), remaining building stone resources, and potential markets for the stone (the Building Stone Database for Scotland, which should become publicly accessible in 2016, will be an important source of some of this information);
- improve awareness of indigenous stone and its benefits amongst the general public and specifiers;
- improve the effectiveness and reach of marketing.

Hitherto, supply and demand in the building stone industry have operated almost entirely within a free market, and this must be seen as a major factor in producing the situation that exists today, where a small indigenous industry is struggling to survive against a rising tide of imports. The stone industry in Scotland is unlikely to experience significant growth unless action is taken to improve the business environment in which it currently competes. With this in mind, the industry should:

- engage with Scottish Government and Scottish planning authorities, with the aim of persuading them to provide stronger support for indigenous stone (in terms of both extraction and use) in the form of incentive ('carrots'), statute ('sticks') and a more supportive planning system;
- engage with key stakeholders, including Scottish Enterprise and Scottish Funding Council (through the Construction Scotland Innovation Centre), with the aim of persuading them to provide financial and other assistance with marketing, business development, and innovation in the development and provision of products, information, services and business.

To achieve a successful, sustainable outcome, the individual actions proposed above will need to be implemented more-or-less simultaneously, as part of a strategic plan led by the stone industry but with stakeholders at all levels working together towards a common goal.

Appendix 1 Proposals made in previous reviews of the stone industry

Proposal in 1980 report		Proposal in 1997 report		Outcome
1	A strong representative organisation should be formed to serve the whole industry, promote its products and support their users	a	The Stone Federation should establish a strong presence in Scotland which is committed to developing regional resources; this should provide marketing, publicity and quality assurance	Not acted on. The Stone Federation assumed this role would be performed by the Scottish Stone Liaison Group (which has disbanded; see below).
		e	A Natural Stone Institute (NSI) should be formed in Scotland to act as a focus for professional, technical and public interest in building stone. This should have the functions of a learned society to stimulate education and research, and to provide a library, a programme of events and publications	The Natural Stone Institute (NSI) was established in 2001 and initially was run in parallel with the Scottish Stone Liaison Group (SSLG), focusing on professional interests and research. Funding issues and lack of general support from the sector for a 'learned society' led to NSI being merged into SSLG. In 2010 SSLG and NSI were disbanded.
		g	A stone liaison committee should be formed by the Stone Federation in Scotland and the NSI to include representatives from Scottish Enterprise, Historic Scotland, the Joint Standing Committee on Natural Stone and other interested bodies	The Scottish Stone Liaison Group was established, initially under the auspices of Historic Scotland, and from 2000 as a Company Limited by Guarantee. Three project teams – the Natural Stone Institute, Indigenous Materials, and Scottish Stone Industry project teams – promoted SSLG activities. The organisation was funded by Historic Scotland, but was absorbed by that organisation in 2010.
		J	A teleworking network should be set up to link members of the Stone Federation; on-line distribution of information should be used to link stone producers and specifiers, and for the exchange of project data	Not acted on
2	The database and inventory of stones commenced as part of the study should be continued and extended to the EEC	k	The database and inventory of stones, renewed for Scotland as part of this study, should be continued and extended to ensure that the quality of information available to specifiers is at the highest technical level	Between 2008 and 2011, Historic Scotland funded a Research Fellowship post to examine the feasibility of a 'Natural Stone Database for Scotland'. Since 2011, BGS and Historic Scotland have co-funded a project to design and populate a database that will link the individual building stones of Scotland with quarries, buildings and stone samples. Work on the database is ongoing. The database addresses elements of k and m, but currently there is no plan to include technical information about stones.
		m	A database of existing and previous quarries should be compiled, including current status, nature of landfill, accessibility, remaining reserves and projects for which the stone was used	
3	A programme for research and development should be established, under the auspices of the proposed representative organisation and linked with two new university appointments	p	A programme for research and development could be established by the NSI and the Scottish region of the Stone Federation linked with, say, two university departments	The Natural Stone Institute began this task before it was disbanded. Research into stone and stone issues has since been fostered by Historic Scotland and BGS, working with universities.

Proposal in 1980 report		Proposal in 1997 report		Outcome
4	Awards for the use of stone in building and technical innovation should be established on a national significant scale, and grants should be made for personnel in the industry to gain overseas experience	r	Joint industry and government awards for the study of stone in building and technical innovation could be established, and grants should be made for personnel in the industry to gain overseas experience	Not acted on, though for a time Historic Scotland supported Stone Federation GB awards.
5	An integrated promotional scheme should be launched, through a wide range of media, to interest the public, convince specifiers, serve the industry and support sales outlets	d	An integrated promotional scheme should be launched, through a wide range of media, to interest the public, convince specifiers, serve the industry and support sales outlets	Not acted on
		i	A natural stone marketing company should be formed to buy-in standard stone products and block stone for resale to encourage continuity of production	
6	Central technical advisory, publishing, design training and library services should be established, as part of the representative organisation			Not acted on. The Natural Stone Institute was supposed to deliver this but lack of funding and industry buy-in resulted in no progress.
7	The industry should devise and promote standard products and applications in the fields of walling, roofing, paving and flooring, in particular, ashlar blocks to course-in with standard concrete blocks	h	The industry should devise and promote standard products and applications in the fields of walling, roofing, paving and flooring, in particular, ashlar blocks to course-in with standard concrete blocks and stone trim in the Scottish tradition to suit harled walls	Not acted on. The idea has been discussed many times but the Scottish industry is so small and fragmented that there has been insufficient industry buy-in to move this forward.
8	Government action is required to increase the funds in public and private hands for maintaining the building stock and conservation areas, to encourage the more general specification of stone and to provide support for the industry on the grounds of the national considerations			Several ongoing initiatives have contributed to this goal, including the Historic Scotland Conservation Area Regeneration Scheme (CARS) and the Heritage Lottery Fund Townscape Heritage programme, but progress in recent years has been difficult due to the economic climate. The recently launched Traditional Buildings Health Check Scheme, currently running as a pilot in Stirling, is a successful outcome of long-term lobbying on this topic.
		b	The Stone Federation in Scotland should establish a quality assurance and environmental management scheme for members, to be developed as a condition of membership	Not acted on
		c	A labelling scheme for Scottish stone should be established by the Stone Federation in Scotland linked to b	Not acted on
		f	A Scottish stone centre should be established at a suitable quarry to serve as a training centre, working museum and tourist attraction on the lines of that at Warkworth and examples in Wales	Partly acted on. The Engine Shed in Stirling, which is currently under development, is an Historic Scotland project to create Scotland's first centre dedicated to building conservation. The building will be a centre for

Proposal in 1980 report	Proposal in 1997 report		Outcome
			learning and training for both the public and traditional materials professionals.
	l	An inventory of salvaged stone, stone features and reserve stock should be established, and a network of private and public storage depots should be organised	Not acted on. However, Historic Scotland may develop an inventory for its Kerse Road Depot at Stirling in response to the recently launched, Scottish Government-funded Zero Waste Scotland initiative.
	n	A survey should be made of roofing, walling and paving throughout Scotland using rectified photography and photogrammetry, material and mortar testing, and retro-specification to establish a national record of construction	Not acted on. Would be a very resource-intensive task. A GIS-based survey of roofing slates was attempted but did not progress far.
	o	An index of competent retired tradesmen should be formed as the basis of a sponsored in-work training scheme for roofers, walling masons and paviours in association with contractors	Not acted on
	q	A programme of integrated and progressive in-work training with linked teaching should be established for managers, workshop supervisors and operatives for nationally recognised qualifications through to post-graduate studies in a new university school of stone technology	Attempts have been made in various ways to address these issues. The Stone Federation has developed some qualifications for quarry operatives. A new post-graduate course at The Engine Shed (see 'f', above) will in part address the issue.
	s	Planning guidelines should be issued to encourage the more general specification of stone, to provide support for the industry on environmental grounds and to maintain the national identity	The National Planning Framework, national architecture policies, and some local plan policies provide support along these lines. However, policy has proved difficult to enforce, partly because indigenous stone is in such short supply in Scotland.
	t	Development plans should identify existing and potential building stone deposits as resources to be protected when planning applications are considered by reference to the database in m	The National Planning Framework states that Development Plans should do this.
	u	The production energy economy, the potential for re-use, and life cycle cost of dimension stone products should be investigated	The Scottish Institute of Sustainable Technology (SISTech) has published research on energy consumption in stone production, and further work in this area is ongoing.
	v	The impact of potential fiscal measures for environmental protection on the extraction, use, recovery and disposal of building stone should be assessed as an input to public policy	Not acted on

Appendix 2 Summary of current statute and policy statements that are relevant to the extraction and use of building stone in Scotland

Tables 3, 4 and 5 contain statements produced by the European Parliament, Scottish Government and Scottish planning authorities respectively. Key sentences and phrases are in red.

The following paragraphs provide some contextual information.

European Parliament

Four EU 'Procurement Directives' were published in the Official Journal of the European Union on 28 March 2014. The aim of the Directives is to ensure that public purchases are fair, increase the efficiency of public spending, and enable small and medium-sized enterprises to participate in public procurement. Scotland must implement the Directives into national law by 18 April 2016. New Scottish Procurement Regulations replaced the 2012 regulations at the end of 2015. A public consultation on discretionary elements of the new Directives ran from 9 February 2015 until 30 April 2015; the Scottish Government's full response to the consultation was published on 17 December 2015.

Scottish Government

There are three main parts to the planning system in Scotland.

- *Development Plans* – these set out how places should change into the future.
- *Development Management* – the process for making decisions on planning applications. Legislation requires that decisions on planning applications be guided by policies in the development plan.
- *Enforcement* – the process that makes sure development is carried out correctly and which can be used to take action when it has not.

Development plans set out the long term vision for change in the places they cover, including details of where development should and shouldn't happen. They have a key role in delivering the strategy and policy set out in the National Planning Framework and Scottish Planning Policy. They are the legal starting point for making decisions on planning applications.

The National Planning Framework (NPF) is the Scottish Government's strategy for Scotland's long term spatial development, and Scottish Planning Policy (SPP) is the statement of the Scottish Government's policy on national important land use planning matters.

Scotland's first NPF was published in 2004, with subsequent versions in 2009 and 2014. Scotland's first SPP was published in 2002, with subsequent versions in 2010 and 2014. The main legislation is the Town and Country Planning (Scotland) Act 1997.

Table 3 Summary of relevant statements in European Parliament directives

Document	Statement	
EU Procurement Directives	**EU Procurement Directive 2014/24/EU - on public contracts** (The aim of the EU Procurement Directives [published in the Official Journal of the European Union on 28 March 2014] is to ensure that public purchases are made in the most rational, transparent and fair manner in order to increase the efficiency of public spending and enable small and medium-sized enterprises to participate in public procurement.)	**Article 42 Technical specifications[15], paragraph 3** Without prejudice to mandatory national technical rules, to the extent that they are compatible with Union law, the technical specifications shall be formulated in one of the following ways: (a) in terms of performance or functional requirements, including environmental characteristics, provided that the parameters are sufficiently precise to allow tenderers to determine the subject-matter of the contract and to allow contracting authorities to award the contract; (b) by reference to technical specifications and, in order of preference, to national standards transposing European standards, European Technical Assessments, common technical specifications, international standards, other technical reference systems established by the European standardisation bodies or - when any of those do not exist - national standards, national technical approvals or national technical specifications relating to the design, calculation and execution of the works and use of the supplies; each reference shall be accompanied by the words 'or equivalent'; (c) in terms of performance or functional requirements as referred to in point (a), with reference to the technical specifications referred to in point (b) as a means of presuming conformity with such performance or functional requirements; (d) by reference to the technical specifications referred to in point (b) for certain characteristics, and by reference to the performance or functional requirements referred to in point (a) for other characteristics.
		Article 42 Technical specifications, paragraph 4 Unless justified by the subject-matter of the contract, technical specifications shall not refer to a specific make or source, or a particular process which characterises the products or services provided by a specific economic operator, or to trade marks, patents, types or a specific origin or production with the effect of favouring or eliminating certain undertakings or certain products. Such reference shall be permitted on an exceptional basis, where a sufficiently precise and intelligible description of the subject-matter of the contract pursuant to paragraph 3 is not possible. Such reference shall be accompanied by the words 'or equivalent'.

[15] **ANNEX VII Definition of certain technical specifications** 'technical specification' means … in the case of public works contracts the totality of the technical prescriptions contained in particular in the procurement documents, defining the characteristics required of a material, product or supply, so that it fulfils the use for which it is intended by the contracting authority; those characteristics include levels of environmental and climate performance, design for all requirements (including accessibility for disabled persons) and conformity assessment, performance, safety or dimensions, including the procedures concerning quality assurance, terminology, symbols, testing and test methods, packaging, marking and labelling, user instructions and production processes and methods at any stage of the life cycle of the works; those characteristics also include rules relating to design and costing, the test, inspection and acceptance conditions for works and methods or techniques of construction and all other technical conditions which the contracting authority is in a position to prescribe, under general or specific regulations, in relation to the finished works and to the materials or parts which they involve ...

Table 4 Summary of relevant statements in Scottish Government policy

Document	Statement	
National Planning Framework 3, June 2014	**1.6** … We are committed to safeguarding our natural and cultural assets and making innovative and sustainable use of our resources.	
	2.24 Rural areas support a number of economic sectors, including tourism, food and drink and other primary industries. Growth and investment in these sectors relies on the continuing environmental quality of our countryside, infrastructure and the sustainable use of our natural resources …	
	4.2 Our principal physical asset is our land … Our mineral resources support the construction and energy sectors.	
	4.11 Although there is great scope to further develop our tourism sector, our environment is more than a recreational resource. We will also need construction materials and energy minerals to support our ambition for diversifying the energy mix, and past extraction sites will require restoration …	
Scottish Planning Policy, June 2014	**Placemaking**	**SPP 41. (Distinctive)** This is development that complements local features, for example landscapes, topography, ecology, skylines, spaces and scales, street and building forms, and materials to create places with a sense of identity.
		SPP 45. (Resource efficient) This is development that re-uses or shares existing resources, maximises efficiency of the use of resources through natural or technological means and prevents future resource depletion, for example by mitigating and adapting to climate change … It can include using durable materials for building and landscaping as well as low carbon technologies that manage heat and waste efficiently.
	Promoting Rural Development	**SPP 80.** Where it is necessary to use good quality land for development, the layout and design should minimise the amount of such land that is required. Development on prime agricultural land, or land of lesser quality that is locally important should not be permitted except where it is essential … for the extraction of minerals where this accords with other policy objectives and there is secure provision for restoration to return the land to its former status.
	Valuing the Historic Environment	**SPP 135.** NPF3 recognises the contribution made by our cultural heritage to our economy, cultural identity and quality of life. Planning has an important role to play in maintaining and enhancing the distinctive and high-quality, irreplaceable historic places which enrich our lives, contribute to our sense of identity and are an important resource for our tourism and leisure industry.
		SPP 136. The historic environment is a key cultural and economic asset and a source of inspiration that should be seen as integral to creating successful places. Culture-led regeneration can have a profound impact on the well-being of a community in terms of the physical look and feel of a place and can also attract visitors, which in turn can bolster the local economy and sense of pride or ownership.

Table 4 cont.

Document	Statement	
Scottish Planning Policy, June 2014 (cont.)	Valuing the Historic Environment (cont.)	**SPP 137.** The planning system should: (i) promote the care and protection of the designated and non-designated historic environment (including individual assets, related settings and the wider cultural landscape) and its contribution to sense of place, cultural identity, social well-being, economic growth, civic participation and lifelong learning; and (ii) enable positive change in the historic environment which is informed by a clear understanding of the importance of the heritage assets affected and ensure their future use. Change should be sensitively managed to avoid or minimise adverse impacts on the fabric and setting of the asset, and ensure that its special characteristics are protected, conserved or enhanced.
		SPP 141. (Listed buildings) Change to a listed building should be managed to protect its special interest while enabling it to remain in active use. Where planning permission and listed building consent are sought for development to, or affecting, a listed building, special regard must be given to the importance of preserving and enhancing the building, its setting and any features of special architectural or historic interest. The layout, design, materials, scale, siting and use of any development which will affect a listed building or its setting should be appropriate to the character and appearance of the building and setting. Listed buildings should be protected from demolition or other work that would adversely affect it or its setting.
	Planning for Zero Waste	**SPP 180.** Plans should enable investment opportunities in a range of technologies and industries to maximise the value of secondary resources and waste to the economy, including composting facilities, transfer stations, materials recycling facilities, anaerobic digestion, mechanical, biological and thermal treatment plants. In line with the waste hierarchy, particular attention should be given to encouraging opportunities for reuse, refurbishment, remanufacturing and reprocessing of high value materials and products. Industry and business should engage with planning authorities to help identify sites which would enable co-location with end users of outputs where appropriate.
	Promoting Responsible Extraction of Resources	**SPP 234.** Minerals make an important contribution to the economy, providing materials for construction, energy supply and other uses, and supporting employment. NPF3 notes that minerals will be required as construction materials **and** to support our ambition for diversification of the energy mix. Planning should safeguard mineral resources and facilitate their responsible use. Our spatial strategy underlines the need to address restoration of past minerals extraction sites in and around the Central Belt.

Table 4 cont.

Document	Statement	
Scottish Planning Policy, June 2014 (cont.)	**Promoting Responsible Extraction of Resources (cont.)**	**SPP 235.** The planning system should … safeguard workable resources and ensure that an adequate and steady supply is available to meet the needs of the construction, energy and other sectors; minimise the impacts of extraction on local communities, the environment and the built and natural heritage; and secure the sustainable restoration of sites to beneficial afteruse after working has ceased.
		SPP 236. Strategic development plans should ensure that adequate supplies of construction aggregates can be made available from within the plan area to meet the likely development needs of the city region over the plan period.
		SPP 237. Local development plans should safeguard all workable mineral resources which are of economic or conservation value and ensure that these are not sterilised by other development ...
		SPP 238. Plans should support the maintenance of a landbank of permitted reserves for construction aggregates of at least 10 years at all times in all market areas through the identification of areas of search.
		SPP 248. Planning authorities should ensure that rigorous procedures are in place to monitor consents, including restoration arrangements, at appropriate intervals, and ensure that appropriate action is taken when necessary. The review of mineral permissions every 15 years should be used to apply up-to-date operating and environmental standards although requests from operators to postpone reviews should be considered favourably if existing conditions are already achieving acceptable standards. Conditions should not impose undue restrictions on consents at quarries for building or roofing stone to reflect the likely intermittent or low rate of working at such sites.
Creating Places: a policy statement on architecture and place for Scotland (2013)	**Article 4. Design for a low carbon economy**: low carbon design and planning should be a priority. Project clients, commissioners, designers and approvers should encourage design innovation and take advantage of locally-sourced materials to facilitate sustainable development. A 're-use not replace' approach should be considered first when dealing with our existing built environment.	
	Article 4.3 We will continue to work to ensure that the appropriate skills and materials are available to conserve, repair and maintain our existing buildings, so that they continue to contribute to the low carbon economy.	

Table 5 Summary of relevant statements in selected Scottish planning authority local plans

Document	Statement	
Moray Council Local Plan, 2015	**Built Environment, Policy BE2, Listed Buildings**	Alterations and extensions to listed buildings or new developments within their curtilage must be of the highest quality, and respect the original structure in terms of setting, scale, materials and design.
	Environmental Resources, Policy ER3: Safeguarding Mineral Reserves	The Council will safeguard all existing workable mineral reserves/operations from incompatible development which is likely to prejudice it unless; (i) there are no alternative sites for development, and (ii) the extraction of mineral resources will be completed before development commences.
		This policy aims to ensure that minerals reserves are safeguarded from development that may sterilise them. The availability of construction materials provides jobs and supports the local economy. The demand for and scarcity of consented reserves for building stone means that reserves should be safeguarded as they are important for the repair of existing buildings and as a new building material.
	Environmental Resources, Policy ER4: Mineral	The Council will support, in principle, mineral extraction in the following circumstances: (i) extension to existing operations/sites; (ii) reopening of a dormant quarry; (iii) a reserve underlying a proposed development where it would be beneficial to extract prior to development. New minerals sites will only be permitted where it has been demonstrated that existing reserves have been exhausted or are no longer viable and for construction aggregates it has been evidenced that there is less than the minimum 10 year supply available.
	Residential Development, Policy H4: House Alterations and Extensions	House alterations and extensions will normally be approved if the appearance of the house and the surrounding area is not adversely affected in terms of style, scale, proportions or materials. Pitched roofs will be preferred to flat roofs, piended dormers to box dormers. Existing stone walls should be retained as far as possible.
	Residential Development, Policy H7: New Housing in the Open Countryside	Uniform external finishes and materials including slate or dark 'slate effect' roof tiles.

Table 5 cont.

Document	Statement	
Aberdeen Local Plan, 2012	**Delivering Sustainable Communities, Policy 3.19 Promoting High Quality Design**	Development must promote good architecture, foster excellence in design, involve the community, ensuring value for money and sustainable development is achieved. The design of new development will be based on an understanding of its context and respond to its location, both in terms of landscape fit and design quality. Existing historic context will inform development where appropriate. This does not mean pastiche or imitation buildings are required. Well-proportioned and detailed contemporary architecture can be designed to fit most contexts and this is always preferable to a poor pastiche. This does not preclude using historically informed design in authentic materials, where this would complement the adjacent buildings or streetscape.
	Delivering Sustainable Communities, Policy 3.25 Built Heritage	Aberdeen is known as the Granite City. Granite has unified many periods and styles of architecture to give the City its distinct identity, but its use has declined due to high cost and changing building construction. As a consequence, the existing granite heritage should be conserved and the use of granite in new development should be encouraged.
	Delivering Sustainable Communities, Policy D1 Architecture and Placemaking	To ensure high standards of design, new development must be designed with due consideration for its context and make a positive contribution to its setting. Factors such as siting, scale, massing, colour, materials, orientation, details, the proportions of building elements, together with the spaces around buildings, including streets, squares, open space, landscaping and boundary treatments, will be considered in assessing that contribution.
	Delivering Sustainable Communities, Policy D4 Aberdeen's Granite Heritage	The City Council will encourage the retention of granite buildings throughout the City, even if not listed or in a conservation area. Conversion and adaptation of redundant granite buildings will be favoured. Within conservation areas, neither conservation area consent nor planning permission will be given for the demolition or part removal of granite buildings (excepting those buildings that make an insignificant contribution to the character of the conservation area). Consent will not be given for the demolition of granite-built garden or other boundary walls in conservation areas. Where a large or locally significant granite building that is not listed or in a conservation area is demolished, the City Council will expect the original granite to be used on the principal elevations of the replacement building.

Table 5 cont.

Document	Statement	
Aberdeen Local Plan, 2012 (cont.)	**Delivering Sustainable Communities, Policy D4 Aberdeen's Granite Heritage (cont.)**	The City Council will seek to retain original setted streets and granite pavements in conservation areas, and elsewhere if they contribute significantly to a sense of place. Where the opportunities occur, greater use will be made of granite in resurfacing historic streets in the City Centre.
		The City Council will seek to retain coach houses and other large granite-built outbuildings adjoining rear lanes in conservation areas and conversion to appropriate new uses will be encouraged.
	Delivering Sustainable Communities, Policy NE2 Green Belt	Proposals for extensions of existing buildings as part of a conversion or rehabilitation scheme will be permitted in the green belt provided: a) the original building remains visually dominant; b) the design of the extension is sympathetic to the original building in terms of massing, detailing and materials; and c) the siting of the extension relates well to the setting of the original building.
Falkirk Local Development Plan, 2015	**Policy D02 Sustainable Design Principles**	**4. Climate Change & Resource Use.** Development should promote the efficient use of natural resources and the minimisation of greenhouse gas emissions through energy efficient design, choice and sourcing of materials, reduction of waste, recycling of materials and exploitation of renewable energy.
	Policy D09 Listed Buildings	The layout, design, materials, scale, siting and use of any development affecting a listed building, or its setting, including extensions, replacement windows, doors, roofs, rainwater goods, boundary treatments and other features, shall be appropriate to the character and appearance of the building and its setting.
	Policy D10 Conservation Areas	New development in Conservation Areas should preserve or enhance the character and appearance of the Conservation Area, with particular reference to the historic pattern and density of development; its setting; the architectural style, massing and materials of buildings; landscape treatments; and boundary features.
	Policy D11 Areas of Townscape Value	Development proposals will be required to fit with the distinctive character of the area with particular reference to the historic pattern and density of development; its setting; the architectural style, massing and materials of buildings; landscape treatments; and boundary features.
	Policy HSG07 Residential Extensions and Alterations	Extensions and alterations to residential properties will be permitted where … the scale, design and materials are sympathetic to the existing building …

Table 5 cont.

Document	Statement	
Falkirk Local Development Plan, 2015 (cont.)	**Policy RW02 Mineral Resources**	No new quarries, or extensions to existing workings, will be permitted for the extraction of construction aggregates. Proposals for the extraction of non-aggregate construction materials, such as dimension stone, will be considered having regard to the overall scale of development proposed.
Loch Lomond and the Trossachs National Park Plan 2010-2015 (Policy ENV21 'Listed Buildings' is essentially identical to the 'Listed Buildings' policy statement of Falkirk Council (see above) and is not repeated here.)	**3.2 The Planning Context. Land-Use Change and the Park's Special Qualities**	The geodiversity of the Park has led to a significant heritage of quarrying for building materials which has contributed to the distinct character of the area's built heritage. Metalliferous resources, including gold, also exist near Tyndrum. There is a need to consider the circumstances where special cases for extraction may be accommodated in the Park without detriment to special qualities.
	Policy D1 Design Quality	Development proposals must be of a high quality design that … demonstrates an understanding of local building traditions and materials.
	Policy ENV20 Conservation Areas	Development and demolition within a conservation area or affecting its setting will only be supported where … its design, materials, scale, layout and siting is appropriate to the character or appearance of the conservation area and its setting. Replacement windows and doors on traditional buildings within conservation areas should normally match the original in relation to materials, proportions, method of opening and appearance.
	Policy HOUS7 Alterations and Extensions to Dwellings	Alterations and extensions to dwellings will be supported where the design, siting and materials complement the character of the original dwelling and/or nearby dwellings and does not have any adverse impact on their amenity.
	Policy MIN1 Proposals for Re-opening Old Mineral Sites and New Mineral Extraction	There is a substantial history of mineral extraction in the Park with building materials tending to reflect the nature of the local geology. The use of building materials has changed with evolving social and economic conditions, fewer quarries and ease of access to materials further afield. An effect is that the shortage of locally sourced building materials is eroding the historic character of traditional buildings and conservation areas in the Park and requiring the transportation of materials from outside of the Park.
		Support will be given to proposals to re-open old mineral sites where this would assist in replenishing the stock of traditional building materials in the Park … New mineral extraction including any proposed extension to existing facilities shall only be supported in exceptional circumstances, where it can be demonstrated conclusively that there is an overriding national interest and there is no reasonable alternative source outwith the Park, or that the material to be extracted is required to facilitate the enhancement and maintenance of the Park's built environment.

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