



SCOTLAND'S TRADITIONAL BUILDING MATERIALS

A CONSIDERATION OF CURRENT PROVISION,
CHALLENGES AND OPPORTUNITIES



HISTORIC
ENVIRONMENT
SCOTLAND

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INTRODUCTION

Scotland's historic environment is a significant sustainable economic, cultural and environmental asset which will serve us well in the future if we can rise to the challenge of its stewardship

We believe that the building traditions and materials available historically and currently can teach us much and make a positive contribution to our cultural identity and a low carbon economy.

Stewardship of the traditionally built environment requires the appropriate knowledge, skills and materials to be available. While proactive progress is being made in addressing skills and knowledge, focus on materials supply has been more fragmented.

This report seeks to provide a brief situation report on the status of commonly used traditional materials to provide a starting point for developing a strategy to maintain and encourage the availability of traditional materials to repair existing buildings and create new ones.

Dr David Mitchell, Director of Conservation
March 2017



I. BACKGROUND

Scotland's buildings and infrastructure have been constructed using a diverse range of indigenous and imported materials. From cottages and tenements through lighthouses and piers to palaces and grand civic buildings, our built environment significantly contributes to our sense of place and of identity.

The granite of Aberdeen, the red sandstone of the south west, Scots slate and pantiles, whin setts and Caithness flags – these materials and associated traditions used track the changing social, economic and technical development of our country.

Like all assets, our buildings and infrastructure need repair and maintenance, using the appropriate knowledge, skills and materials, to ensure that they continue to meet our needs. Over the past 100 years, many factors – technological change, industrialisation, conflict and globalisation – have conspired to create a decline in these intrinsically linked areas. Post-war building programmes requiring increased

speed in construction; new, innovative modern products, materials and techniques that required less skill in assembly and replaced the 'old-fashioned' practices of before; skilled labour that went to war and never returned, quarries in-filled and redeveloped. As a result, the repair and maintenance of traditional structures has progressively relied on a diminishing pool of resources (knowledge, skills and materials). This has resulted in the repair of older buildings becoming progressively more expensive, or more modern and incompatible materials being used to poor technical effect, accelerating decay, as well as diminishing the character and appearance of much of our country.

The loss of knowledge and skills in the use of traditional materials has been exacerbated by a construction education and training system that until recently did not include repair and maintenance to any great degree from craft to professional level. This has resulted in a situation where the construction sector is not trained for a large proportion of the work it does in Scotland (around 40 per cent in value, higher in terms of employment, most resilient in terms of economic cycles.) This has



in turn necessitated a series of add on programmes and accreditations to make up the skills shortfall, but essentially at least two generations of construction craftspeople and design professionals have grown up with no familiarity of traditional materials and how to use them.

The supply of traditional materials has been further compromised by the requirement for standardisation of products – British and European Standards require testing, product control and assessment systems that small and regional producers often cannot meet, leading to comments of ‘regulatory capture’ (leading to progressive market consolidation) by larger organisations.

Traditional materials have become regarded not only as hard to get, but complex and difficult to use. Lime serves as a good example – a material that was until recently the binder of choice for more than 2,000 years has entirely been supplanted by cement, a product with a pedigree in domestic work of just under 100 years.

This difficulty in supply and use obliges a second tier of project costs to be borne by the client – consultants to specify and reassure the client that this strange (risky) material is safe to use. Such complex project management and contract hierarchies can result in projects that are unable to proceed smoothly due to diverse checks and choke points, which can also increase cost and project risk.



This is important not just for historic and custodial reasons; it has also had a significant effect on the regional/provincial economies of Scotland. So ingrained is it in the culture that traditional skills and materials are hard to source that there can be a perverse sense of pride in the distance from where they come.

For all these difficulties, there are many successful projects in Scotland that have used traditional materials and techniques in refurbishment and new build, but such projects are mainly carried out by a small community of conservation practitioners and designers.

The sustainability agenda is leading to a reappraisal of the present situation, and a better appreciation of localism, embodied carbon (especially road miles) local employment and rural diversification as well as more familiar arguments of regional distinctiveness and aesthetic.

Ethical procurement of materials from out-with the EU has drawn attention to serious concerns, particularly in the stone industry.

This shift provides a key opportunity for the increased use of traditional materials. A key positive attribute of traditionally constructed buildings is their common potential to be repaired ad infinitum. As long as the appropriate materials are used in the correct manner, the lifespan and embodied energy benefits of existing buildings can be perpetuated.

The traditional building materials of Scotland can be grouped into 13 categories:

- dimensioned building stone
- lime
- brick
- lead
- slate
- aggregates
- thatch
- glass
- stone slate
- timber
- ferrous and non-ferrous metals
- paint
- clay and earth

The following provides a brief summary of the current position in relation to each material.

2. DIMENSIONED BUILDING STONE

Scotland is a country where the primary building material has been stone. As a result, we have inherited a rich and varied stone-built environment that has a high level of regional variation in terms of material use and vernacular style, which reflects the incredible geological diversity of such a small country. From a high point in the late 19th century, when there were approximately 2,500 building stone quarries operating both at a local level or exporting stone across the world, there remain seven active quarries producing rough stone blocks for subsequent cutting into dimensioned stone for use on new build or in repair projects

The stone resource, in most cases, has not run out. It has, however, faced increased competition from imported stone and more modern materials. Due to proper regulatory processes, with regards to environmental concerns and health & safety issues, the opening of new quarries has become more costly when compared to other countries around the world. Many historic quarries reclaimed by nature have ironically become SSSIs or even designated as historic sites.

While we have relearned the uses and applications of building stones in the past 20 years, we have also become increasingly aware of the catastrophic effects of not matching replacement stone petrographically, but often on colour alone – the rate of decay significantly increases.

As a result of the reduced number of quarries, more than 50 per cent of stone used in Scottish projects comes from England, and a further 10 per cent from abroad. National boundaries aside, stone from the north of England has since the early 1900s been 'imported' to provide a range of stone types. However, it cannot meet the particular needs of our built heritage and, when used inappropriately, has damaged our indigenous built heritage.

During the recent downturn in construction, operators of some quarries in the north of England have ceased production on some of the smaller

locations in England to concentrate on larger mainstream operations. This has given those sourcing stone for processing in Scotland problems in acquiring raw block and reduced the options for those repairing buildings in Scotland, sometimes obliging poor matches to be made. Some smaller operators, especially those supplying material for use in new build, have been put under pressure by the recession. Calder Quarry, in Caithness, supplying the well-known flagstones seen in many Scottish high streets went into receivership in May 2009. However, as the importance of matching stone correctly is increasing recognised when repairing buildings in Scotland, there has been movement by some stone processors to look for stone sourced from more local sources, as well as looking at the feasibility of the operation of smaller quarries in Scotland. As a result we are seeing new sources of stone emerging in Scotland.

Due to agricultural diversification, old quarry sites are being looked at by landowners with renewed interest. Another example, in Stirlingshire, has seen a farmer empty waste from a former quarry-turned-landfill site to expose and extract sandstone that fills a gap in the UK market. On a farm in Angus, eight local personnel are in full-time employment processing stone waste and producing raw block



from a sandstone quarry last worked in the 1930s. The stone business now employs at least four times as many people as traditional farm business, not including other economic benefits from local haulage and plant servicing.

While the situation with sandstone is improving, there has been no similar progress with the supply of granite, where there is no volume production for this distinctive material – with granite for works in Aberdeen, Stirling and other Scottish cities being sourced from China, Portugal, India and Finland, while our indigenous resources are crushed to create road-stone.

Quarrying for dimensional stone and aggregate production are almost totally divorced. While some aggregate quarries will allow extraction of large block periodically, their main focus is to blast rock into as small sized pieces as is possible, making it almost incompatible with dimensional stone production.

The quarries differ hugely in scale and in impact, but dimensional stone quarries are often tarred with the same brush as 'super quarries,' which in the public mind means three main issues – noise, dirt and vehicle movements. However, quarrying for building stone is entirely different in scale and tempo. Blasting is not used in most sandstone quarries and used selectively in hard rock quarries. Due to the lack of crushing taking place, dust and dirt are minimal. Processing usually occurs off site at an industrial estate, with strict planning controls. Extraction may not take place continuously, and could typically involve around three lorry moves per week.

Such activity is not prejudicial to wildlife or ecosystems and it can, in fact, create ecological niches.

Remembering that in Scotland there were at least 2,500 of such sites, most of which are still accessible, there is considerable potential for rural diversification and employment, allowing the regrowth of a local supply chain. Parallel to developments on the ground, there is now a better

understanding a national planning level for the need for dimensional stone resources and the differences that exist between them and other extractive industries, and some local authorities are taking that forward at local development plan level. However, there is still action required to encourage more use of local stone in developments and to facilitate supply through collation and dissemination of research into exploitable resources.

Research suggests that the carbon footprint of imported stone over indigenous is much higher due to transportation. This gap could be widened if the processing methods of the Scottish quarries altered. Snatch quarrying on a low-impact scale would be attractive in carbon terms.

Ethical procurement of stone products has in the past decade has become increasingly apparent. Ethical procurement by EU-based companies is improving, but is still by far in the minority.

The building stone industry remains small and faces a range of challenges. In 2016, Historic Environment Scotland commissioned our partners British Geological Survey to make an assessment of the industry in Scotland and identify obstacles to and opportunities for this small but critically important industry. This is the first comprehensive assessment of its kind in over a decade.



KEY FINDINGS FROM 2016 BGS REPORT

- There are 17 quarries in Scotland actively producing building stone in Scotland. They produce 40,000 tonnes per year and employ 160 people at source. Only seven of the quarries are continuously active. This compares to around 5,000 once active building stone quarries identified across Scotland by BGS.
 - Of the 17 active quarries, six have become active in the past 15 years – this is a positive sign.
 - Of the 262,000 tonnes of building stone used in Scotland in 2014, only 27,125 tonnes were produced here, with 262,000 tonnes imported. This figure is rising while only a very small proportion of this material could not be found in Scotland.
 - While the distinct red sandstone of Locharbriggs and Caithness paving is still available, there has been no supply of Scottish slate for more than 40 years. With a declining amount of recycling, almost all slate used in Scotland is imported.
 - The building stone industry in Scotland is small and lacks the resources to promote itself – there is a lack of awareness of availability and benefits to specifiers and consumers.
 - Protection of building stone as an asset does not feature prominently at this time in planning policy and could lever a number of benefits with small policy shifts.
 - EU procurement regulations are a barrier to specifying Scottish material – these barriers are both real and imagined.
 - Imported stone is often cheaper at point of sale, but this obscures the significant environmental costs associated with its production and transport. This can be six times the embodied carbon of a Scottish material.
 - Ethical procurement of stone from outwith Europe has been subject to sporadic scrutiny in relation to health and welfare issues and the use of child labour. There remains little consumer advice or independent verification in this regard.
 - Building stone has the lowest embodied carbon of any commonly used construction material.
 - Quarrying often prompts a negative reaction, despite building stone quarrying being much more limited in impact than aggregate works.
 - Awareness of the traditions, benefits and future uses of indigenous Scottish stone are not well understood or promoted.
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SITUATION

Unsustainable to meet the range and diversity of building stone required to maintain and repair the ageing building stock.

There is potential for localised snatch quarrying for specific projects and for building around the sustainability agenda to provide low carbon indigenous stone for new build. Sustainable procurement is difficult and ethical procurement is not common.

3. SLATE

The situation with slate is similar to that of building stone. In the early 19th century, there were in the region of 200 slate quarries, widely distributed all over Scotland and clustered around the Highland and Lowland boundary faults. The last Scottish slate quarry closed in the 1950s. This final quarry, producing the familiar West Highland Scots slate located at Ballachulish, produced a very durable slate laid in the distinctive diminishing courses with a rough surface texture, which has become the accepted perception of traditional roofing in Scotland. Slate was also imported from Wales and Scandinavia in the 19th century.

Supplies of slate for new works and repairs in Scotland are now imported from all over the world. They are of varying quality and appearance, with materials supplied in the 1980s and 1990s often of particularly poor quality. Reasonable matches for Scottish slate can be made with material from the north of England and Wales, which can be supplied in the random widths and varying lengths required to give the distinctive pattern of a traditional Scottish roof. Historic Environment Scotland is in favour of these sources in repair and new work as it reduces the

demand for reclaimed slate, which is often obtained by stripping existing roofs of their slate.

Importers of slate from overseas press for approval of their product as a replacement for Scots slate. Historic Environment Scotland is not able to 'approve' any product regardless of its properties, as that is seen as supporting a particular product. We are content with favouring and suggesting suitable replacement options that can be delivered in the correct range of sizes to maintain the roofing idiom of diminishing courses. In this way, the craft at least is retained, although in a non-indigenous material.

Historic Scotland commissioned tests to assess the durability and quality of material remaining at Ballachulish and Hill of Foundland in Aberdeenshire. The Ballachulish slate, with proven durability and distinctive pattern once laid, is the preferred choice in any attempt to reopen a quarry to supply Scots slate. The idea has aroused interest at a local and political level, and has generated correspondence and



parliamentary questions regarding reopening of the quarry. A north of England supplier has expressed interest in trial extraction of slate block from the Khartoum quarry at Ballachulish. For this investment to be made the company would need some assistance in the form of grant aid to assist with the substantial costs involved in reopening the site and establishing a working quarry.

In the medium to long term, the demand for Scots slate would have to be stimulated by a push on material specification and informed clients. There has been much media interest in this subject in recent years.

In France, there has existed a similar situation regarding local slate. During the mid 1990s, the roof of Mont St Michael, a major monument in Normandy, required reslating. This significant project generated sufficient demand for a quarry to be reopened with a guaranteed order book sufficient to justify investment and sustain the operation. With a supply of slate available, orders from elsewhere were handled, and now the quarry is self sustaining. There have been reciprocal visits between the communities in France and Ballachulish, and the French consider this to be a very similar situation.

The absence of a large capital project does not need to be an issue, as modelling work commissioned by the Scottish Stone Liaison Group (SSLG) has shown that the demand for a Scots-type slate in the city of Stirling on listed buildings and in conservation areas will be in the order of 89 tons per year.

Again, similarly to dimensional stone, there is the opportunity with Scottish slate to develop sustainable rural industries that can support direct and indirect employment.

SITUATION

The material supply situation has improved in the past few years in the availability of material that better reflects Scottish slate. There is currently no Scottish source of this important building material other than recycled material, which is increasingly running out. The quality of the indigenous material is of very high quality from specific sources and should be exploited as a low-carbon, high-performance roofing material.

4. STONE SLATES

This distinctive roof type using sedimentary stone was formerly common in Scotland before better transport links made Scots and Welsh slate available at a competitive price. Now only pockets of stone slate roofs remain in Caithness and parts of Angus, where the local geology allowed easy splitting of large roofing slates.

As quarrying declined in the 20th century, so too did the supply of stone slates. All repairs and reroofing were done with salvaged slates, a situation that resulted in the stripping of many older roofs. Recently, a stone supplier in Angus has started manufacture of

stone slates for a project in Edinburgh, the first new slates produced on a commercial project for some time – a situation to be tempered with the closure of the only slab quarry in Calder, Caithness.

SITUATION

Limited new material available, on a project-specific basis only, otherwise recycled material only. Material of major cultural significance being lost to the detriment of the built heritage.

5. LIME

The last centre for the production of lime in Scotland was said to have been the Straiton limeworks on the southern edge of Edinburgh, where production ceased in the 1950s. Although there are outcrops of limestone all over Scotland, no lime is extracted or burnt in Scotland today. For construction companies requiring lime, there is a network of suppliers who are able to deliver the products from three manufacturers, only one of which manufactures in the UK.

It is questionable if there is sufficient demand for building lime at the present time in Scotland to justify a business case for a new quarry and burning facilities.

There are other sources of lime, for example the use of shell lime around coastal regions exploited the supply of waste material to hand which could be burnt. Ironically, this vernacular tradition by nature of its simplicity could be readily reinstated, and the present sea food processing industry has extensive waste to clear.

There has been some recent interest in this, although issues of grading and QA would have to be resolved. It would require the relearning and promotion of the skills and knowledge involved. The recent interest in site-mixed hot limes has the potential to reduce the costs of using lime on site in more traditional applications, but the experience here is still developing.



SITUATION

Sustainable but not satisfactory.

6. SAND AND GRAVEL

Supplies of construction aggregates in Scotland are generally from a small number of national and regional suppliers operating a range of sites in all areas of Scotland. Traditional building practice requires a limited range of aggregates – sands for mortar preparation and gravels for rendering and masonry core work. Such material needs to be alluvial in nature, as opposed to material obtained by crushing, which is not suitable to traditional binders.

The intensity of extractive operations has always given this sector an image problem, and most quarrying operations have to run at a fairly high tempo to be cost effective, leading to dust, noise and acoustic complaints.

Historically, aggregate extraction was more localised

and low impact, with material being taken from beaches, rivers and in other deposits. Modern BS and EN requirements on the quality of the material, as well as the planning controls on extraction, mean such opportunistic extractions are only possible for very small projects.

As such, the impact on traditional buildings has been mainly appearance of the aggregate in pointing and mortar finishes, with limited local sources available to match up with existing structures during repairs.

SITUATION

Satisfactory.

7. TIMBER

Scotland has the largest area under woodland in the UK, at 1,341,000 hectares (both hardwood and softwood). Of this, 737,000 hectares are FSC certified. Despite this, the UK is one of the largest importers of wood in the world. Britain as a whole imported 7,748,000m³ of sawn wood in 2006 and more than 90per cent of the wood we use in construction is imported European softwood.

The percentage of softwood grown in native forests is increasing, with uses including fencing, pallet making, general construction and panel board manufacture, but not of sufficient quality for finishing and structural timber use. The Wood Window Alliance notes "it is not regarded as suitable for use in windows and joinery". This is a view that is backed by the Forestry Commission, which notes that all softwoods used in making and repairing windows are imported.

Much of the softwood planted in Scotland in the post-war period has proved to be only marginally successful, and only for low-quality use. In some remote rural areas, costs of extraction outweigh its value. However, each timber element must be judged on its own merits – structural timbers for the new Loch Lomond and Trossachs National Park HQ in

Balloch were native. With hardwoods, the situation is better, and there are many examples of buildings using structural oak in modern and traditional ways. Oak for the Globe Theatre in London came from the Scottish Borders, and timbers for the roof of the Great Hall in Stirling Castle were sourced in Scotland.

Conformity to standards and testing is an issue for indigenous timber in terms of the demands on the small producer. While structural timber is available, the client really has to demand it, and instruct the architect as such. For new build, there are significant extra costs involved in using timber from a non-standard source, where an engineer has to certify proposed structural elements (at further cost for the client) and assure building control that the project is safe.

What is very clear is that in Scotland, only high-status or showcase buildings use native timber; the vast majority of new build and repair work use imported softwoods. Suppliers of more specialised native woods are more common to supply the hobbyist market and this is encouraging. Small-scale social enterprises such as Galgael in Govan are demonstrating the broader benefits of such procurement routes.

SITUATION

Poor for Scottish softwoods, better for hardwoods, but requires stimulation of demand.



8. CLAY AND EARTH-BASED MATERIALS

By their nature, earth-based materials are often readily available. However, the suitability of earth as a building material will depend on the clay content of the soil, and clay from a local or commercial source may have to be added to the locally sourced earth. However, while earth structures have a long history in Scotland, and in many ways have the potential to perform well in embodied energy terms, use of the material remains limited to one part of the eco-build market. Clay has been extracted commercially for brick manufacture in many parts of Scotland, although at present there are only five clay quarries that are commercially active, two of which are old coal bings being reworked for their clay.

The clay building tradition has been well established in many parts of Scotland, although it is now only practised in a fairly small way. Recent examples such as Rowardennan Visitor Centre have showcased this versatile and durable material well. As the demand has always been small, supplies of clay have always come from a few well-known sources, often a considerable distance from the projects.



SITUATION

Reasonable in availability but not in use.
Significant opportunities here.

9. BRICK

Brick manufacture is a product of clay and there are now four companies manufacturing fired clay bricks in Scotland, all by mechanised means. The location of the industry mainly reflects the distribution of clay resources in the Central Belt. These companies operate five brickworks with a combined capacity to produce 120 million bricks per year. All modern bricks made in Scotland are in metric and imperial sizes, although smaller bricks for historic building repair have to come from England, as the manufacture of hand-made clay bricks in traditional sizes ceased with the closure of Errol Brickworks in 2007.

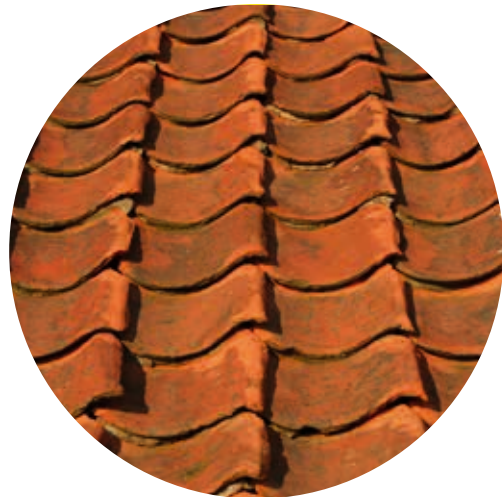
SITUATION

Only imported materials available. Work with Scottish manufacturers required to stimulate supply.



10. CLAY ROOFING MATERIALS – PANTILES AND ROSEMARY TILES

Such tiles are mainly a feature of early 20th-century urban and suburban development, and are fairly common in many parts of Scotland. However, there are no manufacturers in Scotland. This is not in itself a problem, as this fairly modern product is manufactured in some quantity in England, with no supply difficulties. Most repairs are done with salvaged material. The older-type pantile, as used on some Art and Crafts buildings in Scotland, is of a hand-made type, with only one remaining manufacturer in the UK.



SITUATION

Satisfactory.

11. THATCH

Traditionally, there were a wide range of materials used in thatching in Scotland, from 'wild' materials such as broom, heather and marram grass to agriculturally produced straws such as wheat, oats and bere (more than 20 variations are noted in Historic Scotland TAN 4). Thatching was prolific in its use.

The availability of these materials is hard to quantify. Changes in farming practices since the 19th century have made straws of all types increasingly unsuitable for thatch. On the Western Isles, changing crofting practices has led to a decline in the availability of the marram grass formerly used for thatch. While wild resources were commonly available historically,

these would have been cultivated to some degree to produce material suitable for thatching. Many areas of wetland that produce reed thatch are now often protected due to their designation as reserves of SSSI.

To add to this problem, a lack of traditional thatching skills in Scotland means that craftsmen from England, who are used to thatching in different materials, are increasingly carrying out work in Scotland. Reed thatch is increasingly imported from eastern Europe, partly due to price, but also availability. This is leading to a progressive change in what is perceived as 'real' Scottish thatch and the English idiom.

The reality is that most Scottish thatch types are not very durable, and require frequent maintenance – a cost that most owners in Scotland do not wish to bear. Research undertaken in 2016 by HES and SPAB has identified a crisis in high-quality thatched buildings – only around 60 remain.

SITUATION

Very poor, but materials of some types readily available, others not. Key issue relates to skills and demand. Innovative intervention required.



12. FOUNDRY METALS – FERROUS AND NON FERROUS

Manufacture of cast-iron objects and materials in Scotland is carried out by a core of small and medium-sized companies, who can be further broken down into those who cast with green sand and those who use more modern moulding techniques.

There are presently only three who are able to claim any real specialism in architectural work or have a tradition in this area. This compares to the later 19th century, when there were hundreds – if not thousands – of firms able to do this work. Most will cast non-ferrous metals and aluminium as well as cast iron. Architectural ironwork is the best way to describe the type of products that are used in the repair of traditional buildings and associated streetscapes and environs.

The deskilling and changing tastes post-war crippled the industry, which rapidly declined into the 1970s. Embryonic conservation programmes in Glasgow and Edinburgh have helped sustain those remaining, as have the HLF grant schemes,

particularly those focusing on urban parks. There are many pressures on such businesses, from industrial safety requirements to the price of scrap iron and other materials.

Skilled labour is becoming difficult to source, with no training of any description available in Scotland, and that in England not particularly directed towards architectural work. Pattern making is particularly in crisis, with literally only a handful of architectural pattern makers left in Scotland. Rainwater goods are largely imported from overseas, particularly China.

SITUATION

Satisfactory but fragile – due to the small numbers of foundries and pressures on these firms. Skills being exported from overseas. Pattern-making very fragile.



13. WROUGHT IRON

There has been no manufacture of wrought iron in Scotland since the early 1960s and in the UK since 1967. There is presently no known supply of wrought iron on a commercial basis worldwide, although there are some expectations that the skills to do so remain in pockets. Widely supplanted by the advent of steel, present materials are recycled. Blist Hills Museum has the capacity to recycle old material on a limited basis, but it is unlikely to be able to supply the wide range of sections and sizes once available.

The quality is, of course, only as good as the donor material. The use of modern materials as a replacement is a concern from a craft, technical and integrity viewpoint. Presently, due to cost, only high-end conservation projects are using wrought iron.

SITUATION

Poor and debatable if global demand could justify investment required.

14. LEAD

Most lead in Scotland used on traditional buildings is modern rolled lead sheet of varying thicknesses. There are no supply issues apart from it becoming increasingly expensive as a commodity. Historically, lead sheet was made by casting in trays, and is called 'sand cast lead'. This type of material is available from England, but is a niche product. No lead manufacturing takes place in Scotland.

SITUATION

Satisfactory.



15. GLASS

There is presently no manufacture of traditional glass types in Scotland. Earlier glass production traditions are available to supply the niche conservation market in England or Europe in particular. Common types of rolled glass patterns remain available. Specialist coloured glass for leaded windows is a niche market, with reasonable supplies available from Europe.

SITUATION

Satisfactory.



16. PAINTS

WATER-BASED PAINT

Recent changes in fashion and taste have led to an increased use of traditional colours and pigments in domestic and other situations.

While the colour range is much increased, giving affordable options unheard of 20 years ago, the base or binder for the paint is often a modern material, of varying quality and performance. Most modern paints with “heritage branding’ are good for colours, but do not perform in the same way, inhibiting vapour permeability and, in some cases, adversely affecting the performance of the fabric.

Traditionally made paints, lime washes and distempers that are the correct material for traditional finishes are more expensive, although supplies from England and elsewhere are easily obtained. Increasingly, it is being realised that internal surface finishes can play an important role in mitigating damaging aspects of the internal environment, reducing humidity and buffering moisture loading.

OIL-BASED PAINTS

With the advent of VOC regulations that will progressively withdraw oil paints with a high volatile organic content (VOC), there has been much market development on alternatives to oil-based paints. Many versions now exist, although there are significant issues with performance, but this position is slowly improving.

Traditionally, oil-based paints were made from a boiled linseed oil base, augmented with a white or red lead additive to improve coverage and performance. This type of paint has been banned since the 1960s, although used externally under licence on high-quality buildings. Unfortunately, traditional paint is often taken to mean a lead-based paint, with all the damaging associations that go with it. There is confusion around the use of lead in paint and toxicity, which does not balance risk against longevity.

An early version of paint, with a linseed oil base and pigment alone, is being marketed in England as a sustainable alternative to modern oil or water-based paints, and is well established in Scandinavia as a safe and durable product. It is more expensive and harder to apply in a contractual situation, but long-term performance is good.

The Scottish market for lime washes, distempers and linseed oil paints has a long way to go before these products, whatever their actual benefits are, will be used in a regular non-conservation specific project.

SITUATION

Satisfactory in some areas, not in others. Modern alternatives cannot match performance or appearance for traditional applications.

17. SUMMARY AND DISCUSSION

This document provides a brief synopsis of the current situation. Some materials have had more attention over the past few decades than others.

The predominant use of stone for building and roofing has been the subject of good-quality research work in recent years to identify the issues and potential viability of reintroducing supply. There have been some considerable success stories, such as the reintroduction of lime to the marketplace. Some materials are readily available as imported materials –

lead, glass and timber to an extent, while others such as brick are available, but perhaps tenuously so.

Materials such as timber and ferrous metals have received little or no attention as traditional materials, while the former extent of use and application of vernacular building materials is not broadly understood and their use treated with suspicion.

These are, ironically, by their nature often readily accessible since the original materials that were close to hand were often employed.

Table 1: Summary of current material supply situation

Material	Raw material in Scotland?	Scottish source now?	Imported source?	Consistent supply?	Skills to manufacture?	Could we protect or aid access?
Building stone	Y	Y	Y	N	SOME	Y
Slate	Y	Y	Y	N	N	Y
Stone slate	Y	Y	N	N	Y	Y
Lime	Y	N	Y	Y	Y	Y
Aggregate	Y	Y	Y	Y	Y	Y
Timber	Y	Y	Y	Y	Y	Y
Clay and Earth	Y	Y	Y	Y	Y	Y
Brick	Y	N	Y	Y	Y	N
Thatch	Y	Y	N	N	Y	Y
Cast iron	Y	Y	Y	Y	SOME	N
Wrought iron	Y	N	N	N	N	N
Lead	Y	N	Y	Y	Y	N
Glass	Y	N	Y	Y	N	N
Paint	Y	N	Y	Y	N	N

Traditional materials, of course, provide the actual building blocks for the traditionally built environment in Scotland.

That backdrop is an essential driver in economic terms as a tourist attraction and a desirable place to live. It provides for around half the construction turnover in Scotland and the jobs in the sectors surrounding visitation.

In cultural heritage terms, the built environment in conjunction with the landscape and the people

– past and present – are the key draws to Scotland. Those materials, which are generally raw materials derived from the landscape, can be (and sometimes are) protected – to protect the landscape of animals that use them. Identification of stone and aggregate resources, for example, are broadly understood, but often not borne out in practice.

For those materials where the supply is cause for concern, Table 2 seeks to quantify what other drivers might come into play (1 low to 10 high).

Table 2

Material	Scale of use in Scotland	Technical reasons for use	Potential as low carbon?	Potential for new build?	Sustainability score	Total
Building stone	10	10	8	7	7	42
Slate	9	8	8	9	8	42
Clay and earth	5	6	10	7	10	38
Stone slate	3	8	8	9	9	37
Thatch	2	4	10	10	9	35
Brick	6	4	4	9	7	30
Cast iron	7	8	4	2	3	24
Wrought iron	4	10	4	1	2	21



As the predominant building materials, stone and slate rank might be considered the highest priority for concerted action. The risk to the traditionally built environment in not securing supplies is indeed highly significant in preventing loss of fabric, cultural identity, economy and the accelerated decay of buildings.

The historic level of use, or even potential level of use in the future, can be related to a supply and demand model, where the stimulation of supply can be prompted by demand. There are two issues here. The level of capital investment may be too high against the potential return and therefore risky, or the knowledge and understanding required to reinstate supply and eventual end use have been lost or require to be relearned.

We have seen, however, that the following can stimulate demand:

- specification of traditional materials by project managers
- grant aid to narrow the cost gap between modern and traditional materials, or prompt some effort in procurement
- social pressures – eco build, sustainability issues, media and peer pressures
- education – where clients realise the economic and technical benefits

- economics – where owners can realise higher sale prices
- pilot projects or exemplars can inspire others and reduce technical risk for designers
- procurement that supports ethics, good design and sustainability as drivers.

Grant schemes can have a very positive effect and are very direct in impact. Specification can be broad in impact, but the educational challenges are significant (although not impossible) and cost is often the bottom line. The rise of the 'building' television shows have generally had a positive effect, with home owners now aware of the value of well-maintained properties using appropriate materials.

Traditional materials, of course, need to compete in a highly competitive marketplace that can be dominated by cheaper imported goods. While the carbon and sometimes ethical labour issues can challenge the low cost in its broadest sense, cost continues to be the over-riding factor.

The reluctance to participate in market interference or challenge free trade remains a significant obstacle, even if many materials could be specified on an aesthetic or technical performance basis. As the sustainability agenda matures, it could provide the tipping point to prompt the viability for many traditional materials.

18. CONCLUSION

We face a range of challenges in securing access to traditional materials for the future. Good progress has been made in certain areas but there has been a lack of cohesive and focused action.

The time has never been better to make progress. Our technical knowledge is good in many areas, we have a national focus on educating specifiers and users through the Engine Shed - Scotland's national

conservation centre, and traditional materials are able to support truly sustainable development and a low carbon economy for Scotland.

It is perhaps now the time to re-consider this most fundamental of issues to the historic environment and focus on delivering tangible outcomes that will realise focused and broader benefits.



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