

1.0 Definitions

"The specification" means this document

"The council" means The Highland Council

2.0 Scope of Specification

This specification provides full and complete information for both design engineers and contractors to prepare and submit a fully compliant tender bid to The Highland Council.

Detailed in each section are the various regulations, design requirements and Highland Council policies and procedures which must be addressed, considered and included within every tender, in order to make that tender compliant.

Not only does the building services design scheme have to comply with Building Regulations, British Standards, CIBSE guides etc. but it must also comply with The Highland Councils policies & procedures, plans, guides, specifications and design requirements & conditions.

3.0 Related Documents

Each and every item of tender information is to be read in conjunction with this specification and all other information detailed in the Invitation to Tender.

Should any discrepancy become apparent or should the Tenderer find the Specification documents in any sense inadequate or incomplete then clarification shall be sought from The Highland Council.

4.0 The Highland Council's Plans

The Highland Council has produced a programme of action, which sets out its priorities during 2009-12, for making the Highlands one of Europe's leading regions.

4.1 Strengthening the Highlands

The Highland Council's Strengthening the Highlands Programme aims to make the Highlands one of Europe's leading regions, by creating sustainable communities, with more balanced population growth and economic development across the Highlands and to build a fairer and healthier Highlands. The Programme contains commitments across five main themes –

- What we will do for children and families
- What we will do for communities and older people
- What we will do for the economy
- What we will do for our environment
- What we will do to make highland council more effective and efficient

4.2 Corporate Plan

The Corporate Plan for The Highland Council sets out the full agenda of the Strengthening the Highlands Programme; the ambitions for the Highlands, how they will be achieved and how progress towards them will be measured.

The Corporate Plan, approved by the Council in December 2008, will be delivered by working with other public bodies, local communities, voluntary organisations and the business sector. In coalition the Council's Administration will work with all elected members in the Council and ensure that the interests of the Highlands are represented well with Government and Parliaments at the Scottish, UK and European levels.

4.3 Service Plan

The Service Plans are strategic documents which outline how each of the seven services within The Highland Council will contribute to the delivery of the commitments of Council's "Strengthening the Highlands" programme. These detail the measures which each of the following services will undertake to meet the ambitions set out within the Corporate Plan –

- Chief Executive
- Education, Culture & Sport
- Finance
- Housing & Property
- Planning & Development
- Social Work
- Transport, Environmental and Community

4.4 Energy Management Performance Plan

The Highland Council implemented a five-year Energy Management Performance Plan in 2005 (now under the new remit of the Carbon Management Plan) to "green" the use of energy in buildings, setting targets for energy, carbon and cost reductions by 2010 and undertaking an ambitious programme of energy saving measures in the top energy-consuming buildings in its building stock.

The Energy Management Performance plan focused on the energy management of properties alone.

4.5 Carbon Management Plan

In 2006, The Highland Council was one of the first Local Authorities in Scotland to produce a Carbon Management Plan (CMP) with assistance from the Carbon Trust. The CMP came into effect in 2009 and sets out a clear strategy and action plan for Highland Council to further reduce CO₂ emissions by 12% by April 2012 over a 2007/2008 baseline. The plan includes a comprehensive set of energy and carbon reduction programmes throughout the Council.

The primary focus of the CMP is to reduce carbon emissions from not only Council properties (as in the Energy Management Performance Plan) but also the vehicle fleet, business travel, street lighting, internal waste and water.

The Plan ensures that The Highland Council will have achieved the following targets set out in the Housing & Property Service Plan –

- Ensure that all building projects, for both new and refurbished properties, comply with best practice in sustainability such that the Highland Council is seen as an exemplar organisation in the field of sustainability design and facilities management.
- Increase the use of renewable micro generation technology sources to provide energy in the Council estate, with appropriate integration of Wind Turbines, Biomass fuel boilers, combined heat and power (CHP) and solar energy, increasing the overall output from 1800kW in 2008 to a minimum 8000kW by 2012. This is to be combined with a drive to reduce energy consumption through Energy Efficiency measures and behavioural change.
- Improve the energy efficiency of the housing stock and reduce fuel poverty by continuing to implement HRA Capital Programme investment, reviewing capital programme activity for 2012 to 2015 to target energy efficiency work which will contribute to meeting the SHQS, installing low carbon technologies in HRA capital programme, aiming for all Council housing to be rated at NHER 5 or above and reducing carbon emissions by 10% from Council houses.

- We aim to reduce water consumption in all Council building by continuing to monitor the water consumption in Council buildings (non-housing) with a target to reduce consumption by 10% while reporting and monitoring quarterly to the Climate Change Working Group.

In addition, the Carbon Management Plan also ensures that the following targets set out in the Corporate Plan's Theme 4: "What will we do for our Environment" are also achieved –

- Produce and implement a climate change strategy for the Highlands which will reduce our impact on the environment and adapt our services to cope with the impact of climate change.
- As well as improving the energy efficiency of our Council housing stock, reduce the Council's energy use and carbon emissions from our buildings by 15% by 2010-11, from a baseline of 2005, by reducing or avoiding energy costs.
- Increase the use of renewable microgeneration technology sources to provide energy in the Council estate, with appropriate integration of wind turbines, biomass fuel boilers, combined heat and power and solar energy, increasing the overall rating from 1,800 kW in 2008 to a minimum of 4,000 kW in 2010.
- Prepare a green travel plan for the Council by 2008, and work with the Scottish Government to encourage and promote green travel plans for our public sector partners, and all businesses and developments across the Highlands.
- Reduce paper use in our offices and recycle 50% by the end of 2009.

In order to achieve this, the Carbon Management Plan has been broken down into five strategic themes –

- Theme 1: Reduce Carbon Emissions from Internal Operations
- Theme 2: Reduce Energy Costs
- Theme 3: Exploring New Areas for Action
- Theme 4: Promote Awareness and Behavioural Change
- Theme 5: Lead by Example

Furthermore, the council has developed a hierarchy of fuel options for use in council properties; the aim of this is to clearly show which fuels are acceptable, narrowing the options to those that the council believes will allow them to achieve the targets set out above. The hierarchy is as follows:

- Where mains gas is available this will be used as the heating option.
- Where mains gas is not available the following fuels will be considered in this order – Renewables, Electric Fan Assisted Storage Heaters then Heating Oil.

Where mains gas is not available and an alternative fuel option is to be considered then a Fuel Options and Running Costs Appraisal must be carried out (as detailed in section 6); this will determine which alternative fuel will be best suited to the project, minimising energy use and carbon generation.

4.6 Green Council

The Highland Council was one of the first of Scotland's 32 Local Authorities to sign Scotland's Climate Change Declaration in 2007 and then reaffirmed its commitment to delivering greener and more efficient services in the Highlands by re-signing the Declaration in May 2008.

The council has set up a member led 'Climate Change Working Group' also known as the 'Green Council'. The aim of the group is to deliver the relevant commitments contained in Climate Change Declaration along with the aims and commitments set out in the Strengthening the Highlands programme, the Corporate Plan, the Service Plans and the Carbon Management Plan, by overseeing the production and implementation of a climate change strategy for the Highland Region which will reduce the council's impact on the environment and adapt the council's services to cope with the effects of climate change.

One of the council's main commitments through Scotland's Climate Change Declaration is the reduction of greenhouse gas emissions; this has led to The Highland Council becoming "Carbon Smart" and influenced the creation of the Carbon Management Plan.

5.0 Scottish Design Regulations & Guides

Regulations and guides are primary legislation (by Parliament or elected legislative body) that constitutes or constrains rights and allocates responsibilities.

Scotland has various regulations and guides relating to the design and installation of mechanical and electrical services.

5.1 British Standards

British Standards are the standards produced by BSI Group which is incorporated under a Royal Charter (and which is formally designated as the National Standards Body (NSB) for the UK).

BSI Group currently has over 27,000 active standards. Products are commonly specified as meeting a particular British Standard, and in general this can be done without any certification or independent testing. The standard simply provides a shorthand way of claiming that certain specifications are met, while encouraging manufacturers to adhere to a common method for such a specification.

The Highland Council expects that all designs, installations, plant, pipework, cabling etc. will fully conform to the relevant British Standards.

5.2 Building (Scotland) Regulations

The purpose of the building regulations system, which is administered and enforced by Scottish local authorities, is to protect public interest by creating Building Regulations and preparing technical guidance to ensure buildings are safe, efficient and sustainable for all. The system, therefore, does not so much control building work as set out the essential standards to be met when building work or a conversion takes place, and only to the extent necessary to meet the building regulations.

The government has subsequently produced Technical Handbooks titled the Domestic Building Compliance Guide 2010 and the Non-Domestic Building Compliance Guide 2010 which both provide practical guidance on ways of complying with specific aspects of the Building (Scotland) Regulations.

All Highland Council design tender submissions should, as a minimum, comply fully with the Building (Scotland) Regulations.

5.3 CIBSE Guides

The Chartered Institution of Building Services Engineers (CIBSE) is the standard setter and authority on building services engineering. It publishes Guidance and Codes, which are internationally recognised as authoritative, and sets the criteria for best practice in the profession.

The Institution speaks for the profession and so is consulted by government on matters relating to construction, engineering and sustainability. It is represented on major bodies and organisations which govern construction and engineering occupations in the UK, Europe and worldwide.

The CIBSE Guides will form the basis of any Highland Council design project tender.

5.4 BREEAM

BREEAM is the world's foremost environmental assessment method and rating system for buildings, BREEAM sets the standard for best practice in sustainable building design, construction

and operation and has become one of the most comprehensive and widely recognised measures of a building's environmental performance.

A certified BREEAM assessment provides The Highland Council with:

- Market recognition for low environmental impact buildings
- Confidence that tried and tested environmental practice is incorporated in the building,
- Inspiration to find innovative solutions that minimise the environmental impact
- A benchmark that is higher than regulation
- A system to help reduce running costs, improve working and living environments
- A standard that demonstrates progress towards corporate and organisational environmental objectives

BREEAM addresses wide-ranging environmental and sustainability issues and enables the council to demonstrate the environmental credentials of their buildings. Furthermore, the creation of the new Code for a Sustainable Built Environment is hoped to continue to drive forward interest and commitment to sustainable buildings.

A BREEAM report will be carried out on all Highland Council tender submission.

5.5 IEE Wiring Regulations (BS 7671)

The IEE Wiring Regulations (BS 7671) are the national standard for all industrial and domestic electrical installation in the UK and many other countries.

The Regulations are produced by the IET, fully known as the Institution of Engineering and Technology. The IET provides guidance on the application of the Regulations through publications focused on the various activities, from design of the installation through to test and maintenance.

All electrical design tenders and installation shall comply fully with the IEE Wiring Regulations (BS 7671).

6.0 The Highland Council Design Requirements

The Highland Council appreciates that there are various forms of legislation in place governing the design and installation of mechanical and electrical services, however, the council has created its own design conditions, requirements and policy documents detailing The Highland Council's specific requirements.

These are created to ensure that the council gets a degree of uniformity across all its buildings/properties which make the design, commissioning, servicing and maintenance of all mechanical and electrical systems simpler and more cost effective.

6.1 External Design Conditions

An external design temperature should allow for all but the most extreme conditions. Temperature variations throughout the Highlands over the last few winters have proved that current external design temperatures are less than adequate for the Highland climate, especially during extreme winter conditions the region is experiencing. A fundamental pre-requisite to system design is the selection of accurate local weather condition information.

Temperatures in the Highland Region show both seasonal and diurnal variation. January/February are the coldest months, with mean daily minimum temperatures varying from about 2°C on west-facing coasts and in the Western and Northern Isles, to less than -1°C over higher ground. Extreme minimum temperatures can occur in winter; examples include -27.2°C at Altnaharra. Conversely, occasionally to the lee of high ground temperatures can reach up to 15°C in winter.

The varying Highland climate sees mean annual temperatures over the region at low altitude varying from about 8.5°C close to the Moray Firth and about 7°C on Shetland, but over the higher ground temperatures are generally lower so that on Ben Nevis (1344 metres) the annual mean is just below 0°C. Elsewhere in the UK, mean annual temperatures reach over 11°C in Cornwall and the Channel Islands; this emphasises the need for accurate design conditions tailored to the highland climate.

In order to design M&E systems which perform effectively and efficiently during both the warm summer months and extreme cold winter months, which have been experienced in recent years, The Highland Council have created an External Design Conditions document which details the parameters in which all M&E systems must operate. These External Design Conditions break up the highland region into five zones; (1) Thurso, Wick, Landward Caithness, Sutherland & Edderton, Cromarty Firth and Tain & Easter Ross, (2) North, West & Central Sutherland and Wester Ross, Strathpeffer & Lochalsh, (3) Eilean a Cheo, Coal & Mallaig and Fort William, (4) Dingwall & Seaforth, Black Isle, Aird & Loch Ness, Inverness West, Inverness Central, Inverness Millburn and Inverness Ness-side and (5) Inverness South, Culloden & Ardeseir, Nairn and Badenoch & Strathspey, in order to provide accurate area specific design conditions to optimise the performance of the systems.

6.2 Highland Council Design Requirements

The Highland Council has developed a series of its own Design Requirements documents detailing the mechanical and electrical services it wishes to be installed within each building type.

These design requirements take into consideration the specific requirements of each building type along with the requirements of the Highland council as a building owner. The council's maintenance, electrical, mechanical and fire representatives have been consulted during the creation of these documents in order that all services are considered and included.

These documents form the basis of any M&E design and may therefore require systems to be designed over and above the guidelines/regulations discussed within section 5 of this specification.

6.3 Air Conditioning

Many buildings have air conditioning installed simply as it is seen as the quickest and/or easiest solution to cool a room or building. Mechanical ventilation and air conditioning are energy intensive processes and factors such as noise, pollution and excessive heat gains can prevent the use of a passive solution meaning that designers need to consider the next best energy efficient means of providing ventilation. Energy consumption has risen significantly due to an often-unnecessary increase in the use of air conditioning in many buildings.

When a full air conditioning system is added to a design it can add up to 50 percent to the total running costs for the building and therefore, should be very carefully considered before being installed.

In order to combat this The Highland Council has issued an Air Conditioning Policy, which clearly advises when & where it is acceptable to install an air conditioning system and when & where it's not. The aim of this policy is to minimise the use of air conditioning and subsequently the running and maintenance costs along with the energy consumption and carbon footprint of the council's building stock.

6.4 Energy Performance Certificates (EPC)

Scotland, as part of the United Kingdom along with all other EU member states has an obligation under the Energy Performance of Buildings Directive (EPBD) to promote improvement in the energy performance of new and existing buildings

An Energy Performance Certificate (EPC) is a document which states the energy efficiency of a building based on the standardised way that the building is used.

Energy Performance Certificates contain –

- Information on your home's energy use and carbon dioxide emissions
- A recommendation report with suggestions to reduce energy use and carbon dioxide emissions

There are 4 different types of EPC –

- Domestic New Build
- Existing Dwelling
- Commercial New Build
- Existing Commercial Building

The Highland Council has a legal responsibility to have a valid EPC for every building in its stock. A relevant draft EPC should therefore be included in the tender submission for all design projects; where the tender is for domestic housing an EPC should be submitted for each house type.

6.5 Simplified Building Energy Model (SBEM)

A Simplified Building Energy Model provides an analysis of a building's energy consumption; estimating the monthly energy use and carbon emissions. Allowing The Highland Council to assess and work towards reducing both the energy consumption and carbon footprint of its building stock. The Highland Council have an obligation to strive for an excellent outcome from SBEM calculations.

Every new commercial/industrial/retail building The Highland Council constructs after 7th April 2006 requires an SBEM calculation along with any new extensions to existing commercial buildings, where the total useful floor area is greater than 100m² and greater than 25% of the total useful floor area of the existing building.

An SBEM calculation including all supporting electronic files should be included (when relevant) within the tender submission for all design projects.

6.6 Option Appraisals

As options appraisal's become a more common tool in public management there is evidence that 'appraisal bias' is leading to pre-selected options and construction of particular outcomes by the selective use of evidence and narrow evaluation criteria. Yet, a rigorous and investigative approach can be very productive, directing attention to longer-term needs rather than short-term interests. It is therefore essential that any options appraisal carried out is comprehensive and rigorous.

When it comes to the M&E design within a council property a comprehensive and rigorous appraisal process is important to:

- Maximise the opportunities for design improvement and ensure the best use of technology
- Identify any adverse impacts and to design projects to eliminate adverse cost impact.
- Meet the council's requirements to identify the full range of costs and benefits and to obtain sustainable value for money.
- Adopt best practice procedures to meet policy and project requirements and standards.

The Highland Council expects an option's appraisal for fuel options and running costs to be carried out on every design project, ensuring the council gets the most cost effective and energy efficient design that will satisfy not only the council's requirements but also those of the tenant/employee's who will occupy the building. In order to achieve this the council has created a Fuel Option & Running Costs Appraisal spreadsheet.

6.7 In-use Monitoring of Performance

Energy monitoring is an important feature in the running of buildings today. In order to determine whether the predicted performance figures, at design stage, are being achieved the Design Consultant will carry out In-use Monitoring throughout the 12month 'defects' period

following handover. It is therefore important that any predicted running costs/figures for a design project are as accurate as possible.

Monitoring will be carried out using the BEMS system in larger properties or Testo Data Loggers (or equal and approved) in smaller properties.

Within the council's larger properties the BEMS system must be open protocol and capable of being accessed remotely; this allows the council's Energy & Sustainability Team to monitor the energy consumption of its larger properties from their office.

6.8 Seasonal Commissioning

The practice of seasonal commissioning is an important aspect of the council's plan to *"Green our use of energy in buildings, setting targets for energy, carbon and cost reductions and undertaking an ambitious programme of energy saving measures in our top energy-consuming buildings."* As set out in the Energy Management Performance Plan.

Seasonal commissioning involves –

- The testing of all building services under full load conditions i.e. heating equipment in the mid-winter, cooling/ventilation in the mid-summer and under part load conditions during Spring/Autumn.
- Where applicable, testing should also be carried out during periods of extreme (high or low) occupancy.
- Interviews with building occupants (where they are affected by the complex services) to identify problems or concerns regarding the effectiveness of systems.
- Re-commissioning of systems (following any work needed to serve revised loads) and incorporating any revisions in operating procedures into the O & M manuals.

The Highland Council's Seasonal Commissioning Policy details this further.

All design projects will be subject to 12 months of seasonal commissioning following the completion of the project. This commissioning will be co-ordinated by the Design Consultant who will liaise with The Highland Council's Energy & Sustainability Team.

7.0 Energy Considerations

Reducing the energy consumption of the building stock is a priority for The Highland Council; not only to help in combatting climate change but also to reduce overall running costs.

7.1 Energy Use

Buildings are one of the heaviest consumers of natural resources and account for a significant portion of the greenhouse gas emissions that affect climate change. 40% of the UK's energy consumption is building related. Energy Use in Local Authority Buildings is not only a significant environmental factor for The Highland Council but also a cost factor; there is therefore not only a social obligation to minimise a buildings energy use and its environmental impact but also a strong economic one.

All M&E design tender submissions should be shown to be energy efficient with an option appraisal identifying why a particular design was chosen over others, a relevant EPC showing the energy consumption figures and an SBEM calculation (where relevant) detailing the building energy use.

7.2 Energy Management

Energy management is the process of monitoring, controlling and conserving energy in a building or organisation. Energy management is the key to saving energy; it is not a one-off exercise, to be effective it needs to be an ongoing process. There are a couple of ways of managing the energy used within a building; through Facilities Management and well-designed Energy Management Systems.

Reducing the energy use within all existing buildings along with ensuring all new buildings are as energy efficient as possible is a primary aim of the Highland Council. The Council's Energy Management Project Plan details this.

7.3 Green Council

The Highland Council was one of the first of Scotland's 32 Local Authorities to sign Scotland's Climate Change Declaration in January 2007. The Council then reaffirmed its commitment to delivering greener and more efficient services in the Highlands by re-signing the Declaration in May 2008.

As a signatory, the Council is committed to producing an annual statement on local progress towards mitigating climate change and identifying how the local Authority should adapt to its likely effects.

Through the Climate Change Working Group (The Green Council) The Highland Council aims to -

- Mitigate against climate change through the reduction of greenhouse gas emissions from its own estate and practices.
- Mitigate against climate change through the reduction of greenhouse gas emissions in the Highlands through the range of services provided by the Council and in partnership with other statutory, voluntary and private sector organisations.
- Adapt its services to deal with the impact of global warming and extreme weather events (considering both threats and opportunities) and in particular regarding impacts of large-scale flooding and community level.

One aspect of this is to ensure that the council is working towards reducing the energy consumption and carbon footprint of its building stock. The council must therefore ensure that any M&E services designed are as energy efficient and sustainable as possible.

7.4 CRC Energy Efficiency Scheme

The CRC Energy Efficiency Scheme (previously named the Carbon Reduction Commitment) is the UK's first mandatory carbon trading scheme.

The CRC Energy Efficiency Scheme is a mandatory emissions trading scheme, targeting emissions currently not included in the EU ETS or Climate Change Agreements. This scheme will include for example, supermarket chains, hotel chains, office-based corporations, government departments and large local authorities (including Highland Council). The scheme has been developed by the Department of Energy and Climate Change (DECC) in partnership with the Scottish Government, the Welsh Assembly Government and the Department of Environment Northern Ireland.

The Department of Energy and Climate Change developed the CRC Energy Efficiency Scheme (Carbon Reduction Commitment) to help deliver the UK's pledge to reduce greenhouse gas emissions by at least 80% from 1990 levels by 2050.

Participants successful in reducing energy consumption will not only save money on energy bills but will need to purchase fewer allowances; these savings should be well in excess of the costs of participation.

In addition, participants that perform well will also be placed higher in the performance league table, which will be published annually by the Environment Agency, boosting their reputation as an energy-conscious organisation.

It is for these reasons that The Highland Council must ensure that any new M&E systems perform as efficiently as possible, ensuring low energy costs and carbon generation.

7.5 Energy Performance Certificate (EPC)

EPCs carry ratings that compare the current energy efficiency and carbon dioxide emissions with potential figures that a building could achieve. Potential figures are calculated by estimating what the energy efficiency and carbon dioxide emissions would be if energy saving measures (detailed within the detailed recommendation section of the EPC) were put in place.

The council intends to use the detailed recommendation section within the EPC to undertake works which would help reduce the amount of energy used and the carbon dioxide emitted within each building.

The Highland Council has a legal responsibility to have a valid EPC for every building in its stock. A relevant EPC should therefore be included in the tender submission for all design projects.

7.6 Simplified Building Energy Model (SBEM)

As advised in Section 6.5; every new commercial/industrial/retail building The Highland Council constructs after 7th April 2006 requires an SBEM calculation along with any new extensions to existing commercial buildings, where the total useful floor area is greater than 100m² and greater than 25% of the total useful floor area of the existing building.

An SBEM calculation including all supporting electronic files should be included (when relevant) in the tender submission package.

7.7 Fuel Options & Running Cost Appraisal

The Highland Council has developed a Fuel Options & Running Costs Appraisal spreadsheet which gives a detailed breakdown of the differing fuel options and relevant running costs.

In order to properly assess the running costs of any mechanical design this spreadsheet must be filled in and presented along with the tender submission, giving an immediate overview of the options available and how the chosen fuel option was decided upon.

7.8 In-use Monitoring of Performance

In order to ascertain whether a building is performing well with regards to its energy consumption The Highland council monitors the energy use within its building stock and regularly checks meter readings ensuring that all buildings are performing as expected and that any energy saving measures which are being installed are working to reduce the energy consumption, as expected.

8.0 Environmental Considerations

A new Build or major refurbishment is the perfect opportunity to design in energy savings – savings that will last for the lifetime of the building. Decisions made at the design stage will have significant energy, environmental and cost implications over the life of the building.

8.1 Reducing the Environmental Impact of Building Services

Building Services design impacts greatly on both the internal environment and environmental impact of a building. With buildings accounting for around 50% of all carbon emissions, building services engineers play a significant role in combating climate change.

The Building (Scotland) Regulations give guidance on the environmental aspect of building design.

When designing building services, for a design project tender submission, consideration must be given to renewable energy, sustainability, low carbon technologies and energy management in order to ensure that The Environmental Impact of a building is minimised.

8.2 Low Carbon design

A fundamental requirement for making a new development low carbon is to design out any avoidable energy requirements. Demand reduction takes priority over covering energy requirements through low carbon or renewable sources.

There are some well established over-arching principles of low carbon design –

- Understand energy use in the building type
- Use the form & fabric of the building to minimise energy demand
- Focus on insulation and air tightness
- Use high efficiency building services with low carbon fuel
- Manage energy within the building
- Use renewable energy systems

These principles are explained in greater detail within RIBA's Climate Change Toolkit; Principles of Low Carbon Design & Refurbishment.

Scotland has various sources of low carbon design guidance; The Sullivan Report, Low carbon Scotland Report and Low Carbon Engineering section of the BRSIA website.

However, The Highland council's Carbon Management Plan (CMP) also sets out a clear strategy and action plan for Highland Council to reduce energy costs and CO₂ emissions over the next three years. The plan includes a comprehensive set of energy and carbon reduction programmes throughout the Council; highlighting the need to reduce the councils energy consumption and therefore carbon consumption.

Due to the council's requirement to register for the CRC Energy Efficiency Scheme all design considerations need to encompass fabric energy efficiency, low carbon building services as well as site layout, infrastructure etc. when tendering for a council project. This is fundamental in reducing The Highland Council's energy expenditure and carbon credit cost.

8.3 Low Energy Design

A low-energy building is a building that from design, technologies and building products uses less energy, from any source, than a traditional or average contemporary building of the same use. In the practice of sustainable low energy design, active solar and passive solar building design techniques and components are often used to reduce their energy expenditure.

Achieving low energy use levels within its buildings is a high priority for The Highland Council as detailed in the Energy Management Performance Plan; not only is there an environmental benefit to reducing energy use as much as possible but there is also a cost benefit.

8.4 Sustainable Design

This specification is intended to encourage the development of high quality and sustainably-designed buildings which will minimise impact on the natural environment, help counter the effects of climate change and also promote greater use of local and renewable materials.

In order to encourage sustainable design The Highland Council has created a Sustainable Design Guide along with their Development Plan Policy: Designing for Sustainability in the Highlands.

These highlight the 3 interdependent principles of sustainability –

- Supporting the viability of communities
- Contributing to a prosperous and vibrant local economy
- Safe-guarding and enhancing the natural and built environment

The energy saving trust also have an environmental domestic design guide; The Code for Sustainable Homes, highlighting the requirements for sustainability within domestic buildings.

All Highland Council design tender submissions must be sustainably designed.

8.5 Climate Change Guidance

As a signatory of Scotland's Climate Change Declaration, the Council is committed to producing an annual statement on local progress towards mitigating climate change and identifying how the local Authority should adapt to its likely effects.

The Highland Council is also governed by the Public Bodies Climate Change Duties which aims to assist public bodies in complying with the duties placed upon them by Part 4 of the Climate Change (Scotland) Act 2009.

Through the Climate Change Working Group (The Green Council) The Highland Council aims to -

- Mitigate against climate change through the reduction of greenhouse gas emissions from its own estate and practices.
- Mitigate against climate change through the reduction of greenhouse gas emissions in the Highlands through the range of services provided by the Council and in partnership with other statutory, voluntary and private sector organisations.
- Adapt its services to deal with the impact of global warming and extreme weather events (considering both threats and opportunities) and in particular regarding impacts of large-scale flooding and community level.

These aims must be considered when designing building services for tender submission; accounting for carbon impact, energy use, sustainable design and overall environmental impact.

8.6 Water Minimisation

Water minimisation is about reducing the amount of water we waste, not restricting the amount we drink or use for washing.

In order to adapt to climate change and the expected changes in the seasonality of our water supply, it is prudent to reduce our water use. This will also:

- Save money
- Reduce carbon emissions.
- Contribute to the continuing health of our valuable ecosystems.

The Highland Council's Water Minimisation Policy document details the steps that The Highland Council is taking to reduce its water use and the water saving measures which must be designed into any new or refurbished building.

Water minimisation is an important aspect of low energy, low carbon sustainable building design. Government documents such as the Water Wise White Paper, Water Wise Future Strategy 2010-2011 and the Water Efficient Buildings website offer additional guidelines on reducing the use of water.

8.7 Environmental Planning

In Scotland, changes to permitted development rights for domestic microgeneration technologies introduced in March 2009 have lifted the requirements for planning permission for most solar PV and solar hot water installations. Roof mounted and stand-alone systems can now be installed in most dwellings, as long as they respect certain size criteria; see The Highland Council's Planning Permission website for more information.

However, when considering the installation of such renewable technologies as wind turbines, air source heat pumps, wood pellet stoves and wood log burners the local planning office must be consulted and, where required, a planning application approved before installation commences.

During the initial design stage the location of the technology and fuel store (where applicable) should be thoroughly researched and considered; these locations should be clearly marked, in context, on both plans and elevations of the building with full dimensional information (DxWxH) of the product and its distance from the building, boundaries and other surroundings clearly shown.

Additionally, noise information (preferably NR ratings) for each technology should also be included within the tender submission.

This information will be forwarded to the relevant planning department for consideration, comment and/or approval prior to the project being costed and going on site.

When proposing the installation of a wind turbine(s), in particular, location of the turbine should be carefully considered due to both health & safety and shadow flicker within adjacent buildings.

In many cases, the installation of renewable technologies in domestic premises will be quick and easy due to the introduction of the Town and Country Planning (General Permitted Development) (Domestic Microgeneration) (Scotland) Amendment Order 2009 which came into effect on 12th March 2009. This permitted development order grants the owner of domestic properties rights to carry out certain limited forms of development on the home, without the need to apply for planning permission, this includes the installation of certain renewable energy technologies on a micro generation scale.

8.8 Environmental Health

The role of Environmental Health in building services is to protect and enhance the health, welfare, environment and safety of building occupants by ensuring that the building services designed and installed within a building are as energy efficient and sustainable as possible while providing a comfortable, healthy and safe internal environment.

Maintaining a good internal environment requires attention to the building's heating, ventilation, and air conditioning (HVAC) system.

The Highland Council requires the Environmental Health of building occupants to be considered when designing M&E building services.

Particular attention should be paid when designing and locating kitchen canopies; The Highland Council has found that the cleaning and maintenance requirements of canopies is not considered during the design process, resulting in unnecessary risk to workers while carrying out these tasks.

9.0 Renewable Energy Considerations

Renewable technologies offer an alternative to traditional fuel sources while at the same time offering an energy source which minimises environmental impact and carbon generation.

9.1 The Highland Council's Renewable Energy Strategy

The Highlands have extensive renewable resources through hydro, wind, wave, tide and bio-fuel/energy. Developing ways to harness these are now being explored and developed. This is particularly important at a time when electricity generation from traditional sources is increasingly dependent upon imported materials and the UK Government remains undecided on the future of nuclear generation. The government's document Planning for Renewable Energy is intended to assist planners, regional and local decision-makers and other stakeholders in understanding the often complex issues associated with the different technologies and their application in different environments.

The drive for using energy from renewable sources comes from the recognition that global warming is related to greenhouse gas emissions such as carbon dioxide (CO₂), which arise largely from energy production. The growing awareness of the finite nature of oil and gas reserves is also significant, prompting the exploration of alternative energy sources.

The Highland Council aims to make itself a more sustainable and energy efficient organisation thereby reducing its energy costs, carbon emissions and impact on the environment. One way in which the council can help meet these aims is through increased use of renewable energy and low and zero carbon technologies within its buildings. The Highland Renewable Energy Strategy & Planning Guidelines further explains the council's Renewable Plan.

As a result, Renewable Technologies should be the first energy generation option considered when designing M&E systems for Highland Council properties. Should a Fuel Options & Running Costs Appraisal rule these out, only then should oil, gas etc. be considered.

Furthermore, any contractor installing renewable technologies for The Highland Council must be MCS Accredited and adhere fully to the MCS – Microgeneration Installation Standard: MIS3005.

9.2 Green Council

One of the Green Council commitments is to encourage the installation of renewable energy technologies into the Highland Council's building stock. The Green Council have already backed the installation of photovoltaic and solar hot water panels on many of the Council's buildings and continue to encourage the use of renewable technologies in place of fossil fuels.

9.3 Feed-In Tariff

In order to help increase the generation of energy from renewable technologies the government has introduced the Feed-In Tariff; a scheme that pays people for creating their own "green electricity".

The Feed-In Tariff is designed for normal energy users, such as households and businesses, and has three main benefits:

- You get paid for the energy you produce and use in your property or sell back to the grid
- You save money by reducing the amount of energy you buy from your energy supplier
- You contribute to the aim of producing 8% of the UK's energy through the tariffs

The Highland Council is taking advantage of this tariff by installing PV's and wind turbines into it's buildings to help reduce energy demand and cost as well as generate income from the tariff.

The integration of wind turbines, photovoltaics and/or hydro power, where practical, into the M&E Designs for new and existing buildings will contribute greatly to reducing the council's energy demands, energy costs and carbon generation while allowing the council to take advantage of the revenue which is able to be generated by the Feed-In Tariff scheme.

9.4 Renewable Heat Incentive

The Renewable Heat Incentive (RHI) is similar to the Feed-In Tariff in that it is a scheme which pays people for generating energy from a renewable technology; in the case of the Renewable Heat Incentive the energy medium is heat.

Initially only the following technologies will be supported by the RHI –

- Biomass Boilers
- Biogas Combustion
- Deep Geothermal
- Ground Source Heat Pumps (Water)

- Water Source Heat Pump (Water)
- Energy for biomass proportion of Municipal Solid Waste
- Solar Thermal (up to 200kWth)

The Renewable Heat Incentive makes renewable heat not just an environmentally sound decision for The Highland Council but also a financially attractive one. By designing renewable systems which are supported by the RHI into council properties the council can reduce carbon generation, fuel costs and generate an income; renewable technologies should be the first heat source option considered when designing mechanical systems for Highland Council properties.

10.0 Fuel Considerations

Due to the geographical area of the highland region not all fuel types are available at all properties. Fuel availability should be checked before carrying out a Fuel Options & Running Costs Appraisal.

10.1 Gas

Gas is often described as the cleanest fossil fuel, producing less carbon dioxide per joule delivered than either coal or oil and far fewer pollutants than other hydrocarbon fuels. However, in absolute terms, it does contribute substantially to global carbon emissions, and this contribution is projected to grow.

The Highland Council has a Gas Safety Management Manual which details the councils Corporate Gas safety Policy, Gas safety Management Policy (No. 014), Gas Safety Management Procedural Document (PCD 017) and Gas Safety Management Operational Instructions (OI-ISC-001 to 013). These documents should be consulted prior to the design and installation of a gas system within Highland Council properties.

Additionally, The Highland Council requires that all gas appliances are serviced every 12 months and no more frequently; this is to ensure a degree of continuity across appliances and to minimise unnecessary costs. No gas appliances which require servicing more frequently shall be acceptable for installation within Highland Council properties.

10.2 Oil

Heating oil is a method for home heating that is used throughout Scotland and the Highlands; it is the rural communities primarily, that rely on oil for heating. In terms of popularity, oil is second only to natural gas.

There is an environmental concern when it comes to the extraction, distribution and storing of heating oil; serious environmental damage. Environmental damage is very expensive to cleanup and it can seriously affect human health and property. It can also pollute water courses, damage plants and wildlife, make soil infertile and ruin habitats.

Additionally, like mains gas, oil prices are on the rise and are likely to remain high as the UK competes with growing demand from other countries. Recently prices of heating oil have gone up sharply and the Office of Fair Trading is now conducting a study of the off-grid energy market in the UK.

As oil is delivered by road there is therefore a possibility that the oil could run out while waiting for your next delivery or the delivery vehicle may be unable to gain access in rural locations during particularly extreme winter weather. These are issues which should be considered when specifying and designing heating systems, particularly in the rural areas throughout the Highland region.

The Highland Council requires that all oil appliances are serviced every 12 months and no more frequently; this is to ensure a degree of continuity across appliances and to minimise

unnecessary costs. No oil appliance which requires servicing more frequently shall be acceptable for installation within Highland Council properties.

10.3 Electricity

Electricity is an extremely flexible form of energy, and has been adapted to a huge, and growing, number of uses. Electricity generation is primarily fueled by natural gas and coal which means that emissions of pollutants and greenhouse gases from fossil fuel-based electricity generation account for a significant portion of world greenhouse gas emissions.

However, the increasing use of renewable technologies in the production of electricity means that it is becoming a greener fuel source. There are many possibilities for generating electricity directly from renewable sources of energy based on solar radiation, wind, tides, waves, hydropower and geothermal heat.

Scotland and especially the highlands offer an ideal environment for the domestic scale generation of electricity from renewable sources such as solar photovoltaics and wind turbines. These are ideal technologies for reducing national grid electricity use in highland council properties.

The most cost-effective form of electric central heating uses storage heaters; these heaters use electricity supplied at a cheaper 'night-time' rate to heat up and are designed to keep warm for the whole of the following day. Cheap-rate electricity can also be used to provide hot water via an immersion heater in a hot water cylinder.

Electricity tariffs that provide cheap-rate electricity are usually known as Economy 7 or Economy 10. In order for electric storage heating to be cost effective the property must be on one of the electricity tariffs above.

However, current electricity prices are around three times higher than gas prices per unit of energy. And like gas, electricity prices are also rising and are likely to stay high, as most electricity in the UK is generated in gas-fired power stations any increase in the price of gas will also be reflected in the cost of electricity.

The cost factor is a major consideration when choosing a fuel source for a new heating system within Highland council properties; commercially and domestically.

10.4 Coal

Coal is primarily used as a solid fuel to produce electricity and heat through combustion. World coal consumption was about 6.75 billion short tons in 2006 and is expected to increase 48% to 9.98 billion short tons by 2030.

There are a number of adverse health and environmental effects of coal burning especially in power stations, and of coal mining. These effects include:

- The generation of hundreds of millions of tons of waste products, including fly ash, bottom ash, flue gas desulfurization sludge, that contain mercury, uranium, thorium, arsenic, and other heavy metals
- Acid rain from high sulfur coal
- Interference with groundwater and water table levels
- Subsidence above tunnels, sometimes damaging infrastructure and homes
- Release of carbon dioxide, causing climate change and global warming. Coal is the largest contributor to the human-made increase of CO₂ in the air

Due to the nature of the highland region many properties are remotely located and therefore may only have access to limited fuel sources; coal being one of these.

However, The Highland Council no longer considers coal as a viable fuel source for its domestic properties due to its high carbon footprint. The aim of the council is to phase out the use of coal as a heating fuel and instead use a renewable technology, electric storage or oil heating (in order of preference) where gas is not available.

All properties which are receiving a new heating system and currently have open coal fires will have the coal fire removed and replaced with an electric feature fire and the chimney removed to below roof level and roofed over (where practical).

10.5 Biomass

Biomass is often called 'bioenergy' or 'biofuels'. These biofuels are produced from organic materials, either directly from plants or indirectly from industrial, commercial, domestic or agricultural products.

Biofuels fall into two main categories:

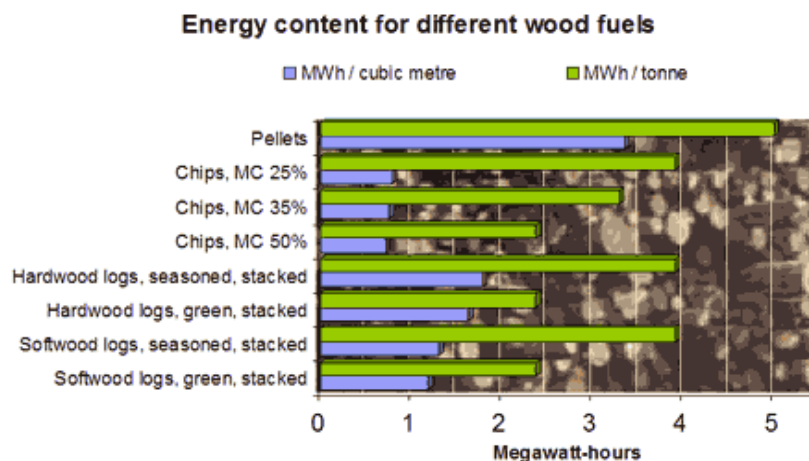
- Wood biomass includes forest products, untreated wood products, energy crops, short rotation coppice (SRC), e.g. willow.
- Non-woody biomass includes animal waste, industrial and biodegradable municipal products from food processing and high energy crops, e.g. rape, sugar cane, maize.

Wood biomass is an attractive fuel for addressing the concerns of the energy crisis and climate change, since the fuel is affordable, widely available, and is carbon neutral and sustainable as long as the crops are allowed to regrow.

The climate impact of biomass is disputed though biomass fuels, including wood pellets and other wood fuels, produced using best practices from sustainably managed forests, fuel crops, or other forms of biomass waste are generally recognized as having far lower net lifecycle carbon dioxide emissions than fossil fuel equivalents, to the order of 98% fewer emissions. However, if best practices and sustainable biomass management is not instituted, carbon emissions can exceed those of natural gas combustion.

Wood biomass is an attractive fuel for use throughout the Highland region due to it's large areas of forestry and farm land.

The graph below offers an indication of the differing energy content of the main biomass wood fuels which are available throughout the Highland Council region –



Wood Pellets: Wood pellets are a refined, homogenised form of wood fuel produced from byproducts of sawmilling and other wood transformation activities. Their consistent properties make them an ideal fuel for automatic heating systems from small scale to large industrial

applications. The pellets are extremely dense and can be produced with a low humidity content (below 10%) that allows them to be burned with very high combustion efficiency.

Emissions such as NO_x, SO_x and volatile organic compounds from pellet burning equipment, are, in general, very low in comparison to other forms of combustion heating, making this one of the less-polluting heating options available.

Pellets take up less storage space than other wood fuels, but require about three times the space needed for heating oil with the same energy content. Storage facilities required will depend on how the pellets are supplied; small systems such as room heating stoves allow pellets to be bought in bags which can be stored anywhere sheltered and out of the rain, however, these is the costlier option.

Pellets are considerably cheaper when bought in bulk and delivered by a truck; however, this requires a hopper, silo or bunker capable of storing at least 5 tonnes of pellets. The final storage solution and capacity is ultimately dependant on the size of the property, the size of the boiler and the availability of fuel, locally.

Wood Chip: Wood chip is a processed form of wood fuel that can be used in automatic equipment without the high degree of processing required to manufacture pellets.

Traditionally woodchips are used as a solid fuel for heating in buildings or in energy plants for generating electric power from renewable energy. The advantage of woodchips is cost while the advantage of wood pellets is the controlled fuel value.

Fuel quality is crucial for reliable operation of a wood chip boiler. The key parameters are material, size and moisture content. Storage facilities for wood chip will also depend on the size of the property, size of the system and the availability of fuel locally.

Wood Logs: Split logs are the traditional wood fuel that has been used for centuries in open fires and more recently in stoves and boilers. For successful burning of wood logs the moisture content should be below 25% so it's advisable to have covered storage facilities for at least one years worth of fuel, to allow for seasoning.

Fuel demand and storage facilities will depend on the size and thermal efficiency of the heated building, however, as a rough indication; a small 1-2 bedroom bungalow might use 8m³ of seasoned stacked logs per year, a 2-3 bedroom semi-detached house around 12m³ and a 3-4 bedroom detached house about 16m³. In terms of storage area this equates to 1.5-1.8m³ of storage space per 1m³ of solid wood when stacked as logs.

Furthermore, with regards to planning permission for such technologies; since 12th March 2009 there is no longer a need to apply for planning permission to add certain "green" energy producing micro generation technology to residential properties. Wood burning boilers and stoves are permitted under the new General Permitted Development (GPD) order, unless:

- The flue exceeds 1m above the roof height
- The appliance is installed on the principal elevation and visible from a road in buildings in Conservation Areas and World Heritage Sites.

Finally, The Highland Council requires that all boilers, stoves etc. are serviced every 12 months and no more frequently; this is to ensure a degree of continuity across appliances and to minimise unnecessary costs. No boiler, stove etc. which require servicing more frequently shall be acceptable for installation within Highland Council properties.

10.6 Air / Ground

A heat pump can be used to provide heating or cooling using the same basic refrigeration cycle to do both. In other words a heat pump can change which coil is the condenser and which the evaporator; this is normally achieved by a reversing valve.

An Air Source Heat Pump uses outside air as a heat source or heat sink. Outside air, at any temperature above absolute zero, contains some heat. An air-source heat pump moves some of this heat to provide hot water or space heating. This can be done in either direction, to cool or heat the interior of a building.

The 'Efficiency' of air source heat pumps (CoP) is limited by the Carnot cycle and will approach 1.0 as the outdoor-to-indoor temperature difference increases (around -18°C / 0°F outdoor temperature for air source heat pumps). Within most normal temperature ranges of say -3°C to 10°C heat pump performance and thus the CoP for many machines can be fairly stable at 3-3.5. However, heat pump construction methods that enable use of carbon dioxide refrigerant extend the figure downward to -30°C (-22°F).

A Ground Source Heat Pump uses the earth, as opposed to the air, as a heat source (in the winter) or a heat sink (in the summer). This design takes advantage of the moderate temperatures in the ground to boost efficiency and reduce the operational costs of heating and cooling systems, and may be combined with solar heating to form a geosolar system with even greater efficiency. A ground source heat pump has less change in CoP as the ground temperature from which they extract heat is more constant than outdoor air temperature.

The geothermal pump systems can reach fairly high Coefficient of performance (CoP), 3-6, on the coldest of winter nights, compared to 1.75-2.5 for air-source heat pumps on cool days.

The Highland Council favours Air Source Heat Pumps for installation in its domestic properties due to the high cost and logistical issues associated with installing Ground Source Heat Pumps in residential areas. It is easier and more cost effective to install Ground Source Heat Pumps in the council's commercial properties which have adequate external space and higher, individual, heating and hot water demands.

Additionally, Ground Source Heat Pumps are permitted through the General Permitted Development order with no restrictions being placed on this technology. However, Air Source Heat Pumps are not permitted at present due to concerns regarding noise and vibration; ASHP systems must have planning permission before being installed.

Finally, The Highland Council requires that all heat pump appliances are serviced every 12 months and no more frequently; this is to ensure a degree of continuity across appliances and to minimise unnecessary costs. No heat pump appliance which require servicing more frequently shall be acceptable for installation within Highland Council properties.

10.7 Solar

Both Solar Electric and Solar Hot water systems utilise the sun's energy. The highlands are not considered the sunniest location, however, enough energy can still be derived from the sun to generate both hot water and electricity.

Solar Electric: Photovoltaic (PV) systems can be installed on most properties as they utilise daylight as opposed to direct sunlight to generate electricity. PV systems can be installed on a building with a roof or wall that faces within 90 degrees of south, as long as no other buildings or large trees overshadow it. In addition, the roof must be strong enough to take the additional weight, especially if the panels are placed on top of existing roof tiles.

Solar Hot Water: Flat plate collector systems use the heat from direct sunlight to heat water and therefore perform better if installed in properties which have roofs that face up to 45 degrees each way off south (between SW and SE), as long as no other buildings or large trees overshadow

it. Furthermore, the structural soundness of the properties roof must also be considered before installing solar hot water systems; as the weight of both the solar panel and the water within it create a large additional loading on the roof.

The Highland Council has various solar electric and solar hot water systems installed in both domestic and commercial properties. These technologies are easily installed in the majority of buildings and can be used to improve energy reduction in any property with any heat & hot water system.

However, there are some conditions for installing solar systems under the new General Permitted Development (GPD) order –

- Solar PV or solar thermal equipment installed on a building shall, so far as practicable, be sited so as to minimise its effect on the external appearance of the building;
- Solar PV or solar thermal equipment shall, so far as practicable, be sited so as to minimise its effect on the amenity of the area; and
- Solar PV or solar thermal equipment no longer needed for micro generation shall be removed as soon as reasonably practicable.

In particular roof mounted solar photovoltaic and solar thermal systems are permitted, in Scotland, unless:

- Panels when installed protrude more than 200mm.
- They would be placed on the principal elevation facing onto and visible from a highway in buildings in Conservation Areas and World Heritage Sites.
- Installed on any part of the external walls of the building if the building contains a flat
- Panels when installed on a flat roof are situated within 1 metre from the edge of the roof or protrude more than 1 metre above the plane of the roof
- Panels when installed project higher than the highest point of the roof

10.8 Wind

In the UK we have 40% of Europe's total wind energy. But it's still largely untapped and only 0.5% of our electricity requirements are currently generated by wind power. With Scotland being the windiest country in Europe, while the Highlands and Islands have Britain's most sustained wind regimes for turbines with significant new investment.

Uses range from very small turbines supplying energy for battery charging systems (e.g. on boats or in homes), to turbines grouped on wind farms supplying electricity to the grid.

Wind speed is one of the most important factors influencing the output of a wind turbine. Wind speed is affected by many factors including height above the ground, presence of obstructions such as trees, houses or other buildings that might disrupt the wind speed and cause turbulence. We recommend that, if you are considering a domestic building mounted installation and electricity generation is your main motivation, then you only consider a wind turbine under the following circumstances:

- The local annual average windspeed is no less than 5 m/s. To check the approximate figure for your location [click here](#).
- There are no significant nearby obstacles such as buildings, trees or hills that are likely to reduce the windspeed or increase turbulence

For more commercial turbines; wind speed increases with height so it's best to have the turbine high on a mast or tower. Generally speaking the ideal siting is a smooth-top hill with a flat, clear exposure, free from excessive turbulence and obstructions such as large trees, houses or other buildings.

Planning issues such as visual impact, noise, shadow flicker and conservation issues also have to be considered; all wind turbine installations require planning permission from The Highland Council's planning department. Wind turbines do not gain automatic installation permission through the General Permitted Development order.

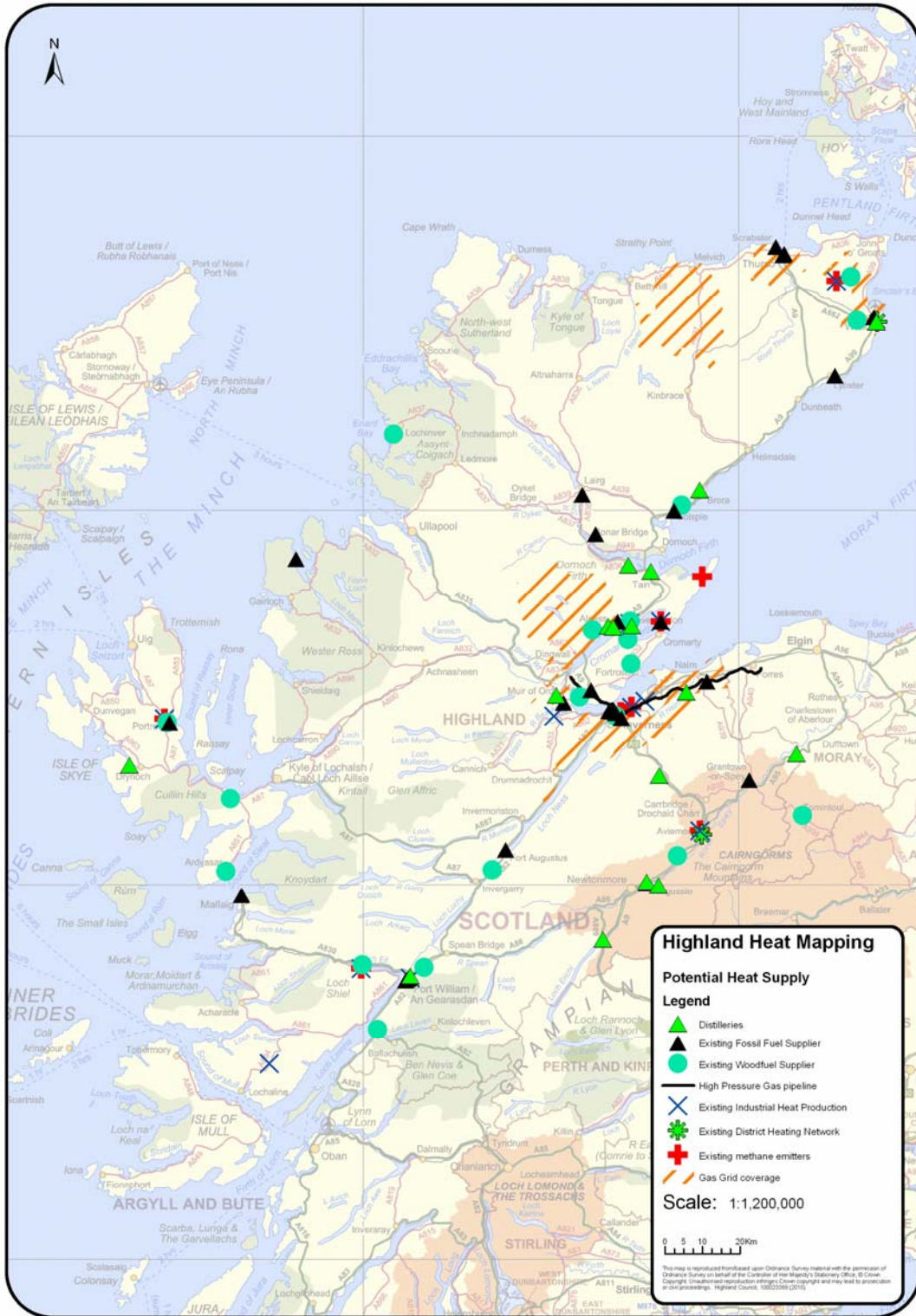
10.9 Fuel Options & Running Costs Appraisal

The Fuel Options & Running Costs Appraisal spreadsheet which The Highland Council has created will, when completed, clearly show which fuel would be the most cost effective for a particular project.

This allows a clear and concise appraisal to be carried out of the different fuel options available to each design project.

The map of the highland region, below, has been extracted from the Highland Heat Map system and identifies the areas of the Highland region which have gas grid coverage along with identifying fossil fuel suppliers and woodfuel suppliers, allowing quick identification of available fuel sources at project location(s).

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11.0 Fuel Poverty

Fuel poverty is a major consideration for The Highland Council due to the geographical area, widespread communities and limited access to fuel sources.

11.1 Introduction to Fuel Poverty

Fuel poverty is where a household cannot heat their home to a comfortable level at a reasonable cost; where there is a lack of 'Affordable Warmth'. Affordable Warmth is the ability to heat your home to an adequate level for household comfort and health, without developing a debt as a result.

The formal definition for Fuel Poverty is set out in the Scottish Executive's Fuel Poverty Statement as "a household is in fuel poverty if in order to maintain a satisfactory heating regime, it would be required to spend more than 10% of its income (including Housing Benefit or Income Support for Mortgage Interest) on all household fuel use."

For the fuel poor the level of spending required to heat their homes may be disproportionately high and this can force people to make difficult decisions between whether to keep their home warm or spend their money on other priorities like food or clothing. Some households spend more than 20% of their income on fuel costs and they are considered to be in extreme fuel poverty.

Households affected are those who are on low incomes. They include some of the most vulnerable groups of people: older people, lone parents, disabled people and those with a long term illness. They are all people who are often at home more than most households and use heat for more of the day.

The three main factors which influence fuel poverty levels are

- fuel prices
- household incomes; and
- the energy efficiency of the housing stock

Measuring fuel poverty is difficult as households can move in and out of fuel poverty as their circumstances change.

Tackling fuel poverty, however, is easier. Tackling fuel poverty not only improves people's quality of life but it also prevents health problems. This in turn reduces the wider costs on health and social services.

11.2 Tackling Fuel Poverty

The Scottish Government is committed to the target that by 2016, as far as is reasonably practicable, no-one in Scotland is living in fuel poverty. This is a key priority for Scottish Ministers and for The Highland Council.

The alleviation of fuel poverty is a priority within the Housing (Scotland) Act 2001.

In light of this new Scottish Government target, the Highland Council is currently revising their existing Fuel Poverty Strategy with the aim to fully integrate it with the council's Local Housing Strategies; in accordance with the latest Guidance to Local Authorities on Fuel Poverty.

Prior to the Housing (Scotland) Act 2001 the Highland Council had developed a detailed Fuel Poverty Strategy which committed to two important aspects of delivering a fuel poverty strategy namely: partnership working and sustainable development and working practices.

The overall aim of the council's strategy was to *"alleviate fuel poverty in the Highlands as far as is reasonably practical by 2016 by helping households in all tenures to make energy savings, reduce their fuel costs and maximise their incomes."*

To achieve this, the Council had set 6 objectives-

Objective 1: To understand the nature and extent of fuel poverty in Highland and use the information to prioritise actions to address its causes.

Objective 2: To improve the energy efficiency of houses in the public and private sector.

Objective 3: To provide impartial energy advice so that householders can make informed choices.

Objective 4: To raise awareness of fuel poverty and energy efficiency so that people and organisations take action to reduce fuel poverty.

Objective 5: To reduce the cost of fuel and minimise the effect of fuel costs on household income.

Objective 6: To maximise householder's income to help them stay out of fuel poverty.

With regard to delivering these objectives; the Council is continually making improvements to its own building stock and these improvements are directly tackling the issue of fuel poverty.

Fuel Poverty is of great concern for The Highland Council which is why it must be a major factor in designing M&E Building services on a domestic scale; the completion of The Highland Council's Fuel Options & Running Costs Appraisal spreadsheet will help determine the most cost effective system for a property.

Efficient and effective M&E building services is paramount in tackling fuel poverty.

When submitting a tender design package, for domestic premises, Fuel Poverty must be clearly acknowledged and shown to be considered when determining the type of M&E systems designed.

11.3 The Highland Council – Area Statistics

According to the most recent Scottish House Condition Survey almost one in three households in Highland (around 32,000 households) can't afford to keep their home warmed to an adequate level; they are considered to be in fuel poverty. This is far higher than the national average - across Scotland as a whole around one in five (22%) households are considered to be fuel poor.

Furthermore, 12,000 households in the Highlands (12%) are living in extreme fuel poverty. Highland's households are some of the worst affected in Scotland. Extreme fuel poverty only affects 7% of households across Scotland.

Highland's private owners and private renters are far more likely to be living in fuel poverty – nearly one third are fuel poor (25,000 households) compared to around a quarter of Highland's public sector tenants (27%) and 23% of Scotland's private owners.

Over half (54%) of Highland's pensioners are fuel poor – this compares with 10% of families and 29% of 'other' households e.g. couples / single people. Again this is higher than Scotland's averages for pensioners and 'others' (41% and 17%). Interestingly though Scotland and Highland's families have similar lower proportions who are fuel poor (10% and 11%).

People living in rural Highland are far more likely to be in fuel poverty – 38% of rural households (18,000 households) can't afford to keep their home warm. This compares with a quarter of the households who live in Highland's towns (13,000 households). Unfortunately the SHCS isn't able to tell us more about the communities where there are particular problems or which are problematic 'hot-spots' (or more accurately cold-spots).

As a result of these figures The Highland Council must ensure that any domestic accommodation it builds is energy efficient and inexpensive to run; if it's going to help towards reducing the high percentage of Highland residence living with Fuel Poverty.

12.0 Health & safety

Health and Safety deals with protecting the safety, health and welfare of people engaged in work or employment. The goal of health and safety is to foster a safe work environment and also protect co-workers, family members, employers, customers, suppliers, nearby communities, and other members of the public who are impacted by the workplace environment.

12.1 The Highland Council's Health & Safety Team

Forming part of The Highland Council's Corporate Services, The Highland Council's Health and Safety Team assists the Council in meeting the requirements of Health and Safety Legislation. This in itself enables the Council to meet the legal obligation contained in Regulation 7 of the Management of Health & Safety at Work Regulations 1999 to seek competent assistance in health and safety matters.

12.2 The Highland Council's Health & Safety Policies and Procedures

The Highland Council has created numerous Health and Safety Policies and Procedures which must be consulted and complied with fully when carrying out work for the Highland Council.

12.3 Health & Safety Guidance

Along with The Highland Council's Policies and Procedures there are various other pieces of Health and Safety guidance which must be adhered to; these include the guidelines laid down within the Health & Safety Executive's guidelines and documents, along with the Building (Scotland) Regulations on Safety.

12.4 Contractor's Health & Safety Obligations

The Highland Council has created a policy document on The Management of Contractors; this policy outlines an effective management control system to ensure the health and safety of all persons affected by the contracted works.

This policy should be adhered to by all Highland Council contractors.

12.5 Fire Protection & Safety

In Scotland, fire safety duties are contained in Part 3 of the Fire (Scotland) Act 2005, as amended, and the Fire Safety (Scotland) Regulations 2006.

The legislation implements a risk based approach to fire safety in community, industrial and business premises. It requires the responsible person (usually the employer, owner or occupier) to carry out a fire safety risk assessment and implement appropriate fire precautionary and protection measures, and to maintain a fire management plan.

The aim of this safety legislation is to –

- Reduce the likelihood and spread of fire
- Provide adequate means of escape which is accessible and functional
- Provide adequate means of detection and warning
- Provide a suitable means of fighting fire
- Specify the action to be taken in the event of fire
- Provide appropriate and adequate fire safety instruction/training

The Highland Council has also created its own Fire and Safety Policy detailing the specific fire safety requirements of the Highland Council which may require additional design over and above that which would satisfy HSE, British Standards etc.

12.6 Legionella

Legionnaires' disease is a potentially fatal form of pneumonia which can affect anybody, but which principally affects those who are susceptible because of age, illness, immunosuppression, smoking etc.

It is therefore important to control the risks within all Highland Council buildings by introducing measures outlined in the Approved Code of Practice & guidance document Legionnaires' disease - The Control of Legionella Bacteria in Water Systems (HSE Legislation) along with all other relevant guidance such as The Highland Council's Water Policy & Procedure.

13.0 Hazardous Substances

Hazardous substances are solids, liquids, or gases that can harm people, other living organisms, property, or the environment. They are often subject to chemical regulations. Hazardous substances include materials that are radioactive, flammable, explosive, corrosive, oxidizing, asphyxiating, bio hazardous, toxic, pathogenic, or allergenic.

13.1 HSE Guidance

Using chemicals or other hazardous substances at work can put people's health at risk, causing diseases including asthma, dermatitis or cancer. The [HSE](#) gives guidance on how to control hazardous substances at work so that they do not cause ill health.

The HSE provides extensive information on the Control of substances hazardous to health (COSHH) and the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH).

13.2 COSHH Regulations

COSHH is the law that requires employers to control substances that can harm worker's health.

The HSE COSHH regulations and The Highland Council's guidance on COSHH must be adhered to fully by any contractor carrying out work for The Highland Council; a COSHH assessment must be carried out on any chemicals or hazardous substances which are being used.

13.3 REACH Regulations

REACH is a European Union regulation concerning the Registration, Evaluation, Authorisation and restriction of Chemicals. It came into force on 1st June 2007 and replaced a number of European Directives and Regulations with a single system.

Almost every business in the UK will have a new responsibility under REACH. There are three main types of REACH duty holder –

- Manufacturers/Importers
- Downstream Users
- Other actors in the supply chain (i.e. distributors, suppliers)

As with the COSHH regulations the REACH regulations must be adhered to fully by any company carrying out work for The Highland Council.

13.4 Asbestos

When asbestos fibres are inhaled they can cause serious diseases which are responsible for around 4000 deaths a year. Asbestos is the single greatest cause of work-related deaths in the UK.

As a result of these serious health risks The Control of Asbestos Regulations 2006 along with all HSE Asbestos Guidance must be fully adhered to in order to minimise the health risk when working with asbestos.

The Highland Council has an Asbestos Register in place; this contains a list of properties which have known or suspected locations of asbestos. The register and associated drawings and photographs can be viewed on the Assist Records website (www.assistrecords.co.uk); the username is the site/building name and the password is asbestos.

The asbestos register should always be consulted before beginning work on any Highland Council property and should also be used in conjunction with The Highland Council's Asbestos Policies & Procedures and The Highland Council's Asbestos Management Plan before any works liable to disturb building fabric or services are carried out.

13.5 Lead

Working with lead can put your health at risk, causing diseases including headaches, stomach pains and anaemia. Other serious symptoms include kidney damage, nerve and brain damage and infertility.

The Control of Lead at Work regulations requires employers to control worker exposure to Lead. These regulations must be followed fully when carrying out work for The Highland Council.

14.0 Membership of Regulatory Bodies

Regulatory bodies exist because of the complexity of certain regulatory and supervisory tasks that require expertise. These bodies deal with regulation and rulemaking - codifying and enforcing rules and regulations and imposing supervision or oversight for the benefit of the public at large.

14.1 Gas safe Register

The Gas Safe Register is the official list of gas engineers, who are qualified to work safely and legally on gas appliances.

All engineers carrying out gas work for The Highland Council **MUST** be Gas Safe registered.

14.2 OFTEC

The Oil Fired Technical Association for the Petroleum Industry (OFTEC) is recognised by the Government, oil companies, heating appliance and tank manufacturers as being the acceptable trade body in technician training & assessment for the domestic heating, oil distribution and commercial oil firing industry.

OFTEC registered technicians are the only people defined as 'competent' and able to self-certify their work without the need for informing the local building control department.

All technicians carrying out oil work for The Highland Council **MUST** be registered with OFTEC.

14.3 NICEIC

NICEIC is the UK electrical contracting industry's independent voluntary body, offering leading certification services, Building Regulations Schemes, products and support to electrical contractors and many other trades within the construction industry.

NICEIC registration not only demonstrates to customers and specifiers that the company possesses the skills and professionalism, it also gives peace of mind that the products and services are the best in the industry.

14.4 SELECT

SELECT, Scotland's trade association for the electrical industry was founded in 1900. SELECT is an independent and autonomous association representing the interests of Members, driving up industry standards', ensuring that work carried out by Member companies is of the highest quality and training the electricians of the future.

15.0 Construction Design & Management

The Construction (Design and Management) Regulations 2007, often referred to as CDM, are important regulations in the construction industry in the United Kingdom introduced by the Health and Safety Executive's Construction Division. The regulations aim to improve safety in the construction industry, which employs over two million people in the UK.

15.1 The Highland Council's Policies

The Highland Council recognise the need to comply with The Construction (Design and Management) Regulations 2007 and to reduce the risks associated with construction work throughout the life cycle of a property.

A Construction Design & Management Policy has therefore been developed by The Highland Council to meet this need.

This policy must be read in conjunction with The Construction (Design & Management) Regulations 2007 and The Highland Council's Management of Contractors Policy and should both be adhered to fully.

16.0 Main Contract Preliminaries and Conditions of Contract

The Preliminaries consist of a series of work sections used to describe the project and its management.

Where the consultant is employed as the lead contractor the following standards should be met when creating the contract preliminaries –

- The use of the National Building Specification (NBS) to ensure a consistent approach to the inclusion of 'Preliminaries and General Conditions' within the tendering documents.
- The Highland Council's Draft Preliminaries include a number of clauses that are 'non-standard', and these must be incorporated regardless of whether the lead contractor uses an alternative preliminaries format or not.
- Unless previously agreed otherwise, the following partially completed Preliminary Templates shall be used by all consultants:
 - Minor Works
 - Minor Works with Contractor Design
 - With Quantities
 - Without Quantities
 - Contractors Design

The Highland Council Draft Preliminaries are provided for consultants to utilise, however, the onus is on the consultant to complete the sections correctly and ensure that the completed preliminaries are project specific.

The Contract Conditions are the terms and conditions set out in this document and any other special terms and conditions agreed in writing between the Contractor and The Highland Council. These include 'general conditions' which are common to all types of contracts, as well as 'special conditions' which are particular to a specific contract.

The Conditions of Contract sets out the rights and obligations of the contracting parties, when a contract is awarded or entered into.

The version of contract which should be used is dependant on the type of contract being entered into. The version used must be agreed with Project Manager in advance of the tender being submitted but in general will be based on the following criteria:

- JCT Minor Works – straight forward project; fully designed and specified by the Consultant; value < £200K
- JCT Minor Works with Contractor’s Design – straight forward project; mostly designed and specified by the Consultant, but with some design elements that need to be undertaken by the Contractor; value < £200K
- JCT With Quantities – more complex or higher value project; measured strictly in accordance with a published Standard Method of Measurement (such as SMM7); can also include Contractor’s Designed Portion; value over £200K
- JCT Without Quantities – more complex or higher value project; based on a drawing & specification document (with or without quantities) but not measured strictly in accordance with a published Standard Method of Measurement (such as SMM7); can also include Contractor’s Designed Portion; value over £200K
- JCT Contractors’ Design – where the Consultant is commissioned to provide Employer’s Requirements/Specifications for a Design & Build contract.

No alternative forms of contract preliminaries or conditions, other than JCT, will be accepted.

17.0 Procurement

The Highland Council’s Procurement Strategy states that “The purpose of public sector procurement is to secure by whatever means is most appropriate, the delivery of public services in a way which will achieve best value for the council and the public” while complying fully with the council’s Contract Standing Orders document.

Procurement is an import aspect of The Highland Council’s business and allows the implementation of the core principles of best value: Challenge, Consult, Compare and Compete. The Contract Standing Orders document applies to the entering into by the Council, or on its behalf, of contracts for the supply, or lease, of supplies, services and works. The purpose of these Orders is to implement within the Council the requirements of legislation and the fundamental principles of the Treaty of Rome applicable to the award of contracts.

In addition, the council has had a Sustainable Procurement Strategy in place since 2003 and in 2010 adopted the Scottish Government’s Sustainable Procurement Self Assessment Framework. This ensures that The Highland Council achieves the aspirations set out in its Corporate Plan with regards to complying with best practice in procurement sustainability.

18.0 Site Management

For the successful execution of a project, effective planning is essential. Those involved with the management of the construction site must consider the environmental impact of the job, the successful scheduling, budgeting, construction site safety, availability of building materials, logistics and inconvenience to the public caused by construction.

19.0 Site & Access

The site or property address is detailed in the particular specification contained within the tender documents for each individual tender pack.

Unless otherwise indicated, the normal hours of working at the site shall be between 0730-1730 hours, Monday to Friday Inclusive. When out-of-hours working is required this will be detailed in the particular specification and the inclusive costs of such work shall be included in the tender submission.

The costs of any other agreed out-of-hours working necessary to complete the works and agreed in advance with The Highland Council Contracts Manager, may be claimed at day works rates, offset against the costs of completing the same work during normal working hours.

Consultants and Contractors should visit the site by prior arrangement with the Contract Manager before completing their tenders, and will be deemed to have satisfied themselves on the full nature of local conditions as regard accessibility, transport and storage of materials, the supply of, and conditions affecting labour and to have obtained all necessary information on all matters affecting the execution and design of the Works.

Claims on the grounds of want of knowledge in such respect, will not be admitted; no increase in price or extension of contract period will be acceptable in respect of any site work difficulties that might reasonably have been foreseen by the contractor during a comprehensive site survey prior to submission of tender.

During site work, the contractor shall take all reasonable precautions and measures to protect any equipment, building fabric, finishes, fixtures and fittings from possible damage. Any such damage will be made good at the contractor's expense.

Finally, The Highland Council requires contractors to ensure that a minimum number of vehicles are used to transport contractor employees to sites; the council does not want to see several vehicles arriving at the site with one employee in each, this does not fit in with the council's "Carbon Smart" principles and its aims to reduce energy use. Furthermore, site parking and access routes generally do not account for too high a number of contractor vehicles being driven to site and therefore these must be kept to a minimum.

20.0 Site Meetings

Periodical meetings will be held at the site as and when required by The Highland Council Contract Manager or the Main Contractor. Both the Mechanical & Electrical Services Design Engineers and Installation Contractor(s) shall arrange to have an accredited representative present at each of these meetings. The Main Contractor shall have previously communicated the name of both the Mechanical & Electrical Services Design Engineers and Installation Contractor(s) representative in writing to the Contract Manager.

21.0 Programme of Works

The Main Contractor shall be responsible for the formulation of a programme of works, which shall ensure that all tasks are completed before the end of the declared period

The programme shall be submitted to The Highland Council's Contract Manager for agreement prior to the commencement of works.

22.0 Labour & Supervision

The Building Services Design Consultant and Installation Contractor(s) shall employ experienced and qualified persons to carry out the Mechanical Works. Such persons may be assisted by graduates apprentices or labourers, but at all times during the execution of the Mechanical Works, their numbers shall not exceed the number of skilled persons.

The Contract Manager may at any time request proof of the level of qualification and / or competence of any person involved with the Contract on behalf of the Building Services Design Consultant and Installation Contractor(s) and if not satisfied may request their replacement.

The Building Services Design Consultant and Installation Contractor(s) shall employ one representative, whose name shall have been previously communicated in writing to the Contract

Manager by the Main Contractor, to supervise the carrying out of the Mechanical & Electrical Works on site. The said representative for the mechanical & electrical installers shall be present on the site at all times during working hours and any orders or instructions which the Mechanical & Electrical Services Designer, Main Contractor or Contract Manager may give to the said representative shall be deemed to have been given to the Mechanical & Electrical Services Installer.

The Main Contractor or the Contract Manager shall have the power to request either the Mechanical or Electrical Services Installer to remove from the works any person employed by them who in their opinion is incompetent or misconducts themselves or does not comply with the above paragraphs of this specification. Any person or persons so removed shall not be employed again on the works without the permission of the person who requested their removal.

23.0 Workmanship

Key components of achieving the desired standards of buildings are the workmanship and the materials used.

The Highland Council expects the work that is carried out by its contractors to be of the highest standard; should the work which is carried out not be of the highest standard, The Highland Council will request the work to be re-done / corrected.

24.0 Materials

24.1 Quality

Unless otherwise specified all material to be used throughout the installation shall be new and shall be of British or EEC manufacture.

All materials shall be of the best of their particular type and the Mechanical Services Installer may be called upon to submit for approval samples of the various materials intended for use in the execution of the work. All materials are to comply with the appropriate British Standard Specification where such is available.

24.2 Specified products

It should be noted that, for tender purposes, any reference to particular item or product lays down the parameters required for that product. These parameters will include type and standard finish, applied technology/inter-component compatibility, thermal capabilities, technical suitability and physical dimensions.

Alternative products may be offered if full details are submitted in writing, at the submission of any tender, for evaluation and approval by the Contract Manager. Any such alterations shall be detailed in the form of a separate schedule indicating any projected cost savings against any scripted product.

Any proposed 'equal and approved'; alternatives will not be considered after the stage of tender acceptance. The offer and acceptance of any tender will be deemed to have established the full specification of the products included therein and the only parameters for re-consideration thereafter will be due to availability parameters.

24.3 Storage of Materials & Plant

The Mechanical & Electrical Services Installer(s) shall ensure that all materials, which are installed or stored on site, are properly protected. The Contract Manager reserves the right to reject any materials which are damaged or corroded due to poor storage, installation, or lack of protection, or materials which do not comply with the Specification.

Rejected materials, whether installed or stored, shall be removed from site within two days and replaced as soon as is practically possible.

It shall be the Mechanical & Electrical Services Installer(s)'s responsibility to ensure that all materials are ordered and delivered to site in sufficient time so as to enable the completion of the work within the period of contract. No additional claims will be allowed for non-compliance.

24.4 Existing materials removed from site

All old materials removed from site shall become the property of the Contractor unless otherwise specified, and he is to make allowance for this when making up his Tender.

25.0 Factory Built Assemblies

Except as further detailed in the specification, all switchgear, motor control gear, AHU's, HRU's etc shall be a factory built assembly of equipment and components forming functional units and groups, the complete assembly will be in full compliance with the relevant British Standard.

26.0 Notices & Labels

Each Installation and every system is to be clearly, concisely and permanently labelled to indicate its purpose and function, to identify key components of the system and to advise and instruct the proper and safe method of system operation.

26.1 Valve labels and charts

Within all plantrooms, each valve shall be labeled numerically and a valve chart clearly displayed within the plantroom indicating valve numbers, function and location.

26.2 Pipework Identification

All pipework throughout a building shall be clearly identified with high quality laminated self-adhesive vinyl tape or pipe wrap banding, with an identification text and symbol to denote the content and flow direction within a pipe and manufactured to BS 4800 & BS 1710 colour coding.

The pipework identification will be installed at regular intervals along pipe routes, throughout the building, in order to allow quick pipe identification in the event of an emergency.

26.3 Ductwork Identification

All ventilation and air conditioning ductwork throughout a building shall also be clearly identified to denote the content and direction of airflow within the duct.

The ductwork identification will be installed at regular intervals along duct routes, throughout the building, in order to allow quick pipe identification in the event of an emergency.

26.4 Health & Safety Signage

The Signpost to The Health and Safety (Safety Signs and Signals) Regulations 1996 bring into force the EC Safety Signs Directive (92/58/EEC) on the provision and use of safety signs at work.

The Signpost to The Health and Safety (Safety Signs and Signals) Regulations 1996 require employers to provide specific Safety Signs whenever there is a risk that has not been avoided or controlled by other means, e.g. by engineering controls and safe systems of work. The Regulations apply to all places and activities where people are employed.

Where a Safety Sign would not help to reduce that risk, or where the risk is not significant, there is no need to provide a Sign.

27.0 Spares

Full details of all recommended spares required to be stocked for the operation and maintenance of the M&E building services shall be provided within the tender submission.

28.0 Tools

Any special tools required for the maintenance or overhaul of the M&E building services shall be detailed within the tender submission.

All details of operating handles, handling equipment, test devices etc. required for the operation and routine maintenance of the M&E building services shall be included within the tender submission.

29.0 Works Inspection & Testing

Inspection and testing of M&E systems should be an ongoing process as the project progresses towards completion and systems receive power.

Inspection and testing paperwork should be filled in as it's carried out and this paperwork should be kept and included within the operation and maintenance manuals for the project.

30.0 Site Testing & Commissioning

Towards the end of the project, when all systems are complete and operational, the testing and commissioning phase will begin.

30.1 Testing & Commissioning

All Mechanical and Electrical systems must be fully tested, commissioned and proved fully operational prior to the project being handed over to The Highland Council.

A detailed testing & commissioning programme will be submitted to The Highland Council 4 weeks prior to the testing and commissioning beginning; this will allow the council to decide whether it will have a representative on-site to witness all or some of the commissioning.

30.2 Testing & commissioning paperwork

All paperwork associated with the testing and commissioning of the M&E systems MUST be kept and included within the operation and maintenance manuals. This paperwork acts as proof that the systems were tested, commissioned and operating correctly at the time of handing over the building to The Highland Council.

30.3 System demonstration

Further to the testing & commissioning the M&E contractor will need to organise a suitable time and date to demonstrate the building systems to The Highland Council, building user and anyone else who The Highland Council wishes to attend.

This demonstration aims to give a hands-on run through of the system operation as an addition to the paper documents and information regarding system operation which is included within the operation and maintenance manuals.

A demonstration acknowledgement sheet detailing the systems and operations demonstrated should be signed by all attending the demonstration to ensure that The Highland Council has evidence that this task was carried out.

31.0 Operational & Maintenance Manual

An Operation and Maintenance Manual describes the key components and systems within a building and explains how they should be operated and maintained to help ensure that the project fulfils its promise to its occupants and The Highland Council. Effective operation and ongoing maintenance are critical to the long term viability of any project.

By making these activities easier to understand - especially by outlining what to do and when - an Operation and Maintenance Manual can help ensure that the building is efficiently operated and well maintained long into the future.

Note: Council procedures must be followed – see CDM co-ordinator for procedure

The Operation and Maintenance Manuals must be handed over to The Highland Council on the day the completed project is handed over to the council.

31.1 Product information / manuals

All original product information booklets and manuals which accompany any plant or equipment installed during a project should be kept and included within the O&M Manual for that project.

31.2 As installed drawings

Accurate creation of As Installed Drawings is fundamental in providing The Highland Council with the correct information to operate and maintain the building services systems.

As Installed drawings should be marked-up during the installation works by the mechanical and electrical site representative in order to ensure they are correct.

These accurate As Installed drawings should be included within the O&M Manual.

31.3 Testing & commissioning paperwork

During the testing and commissioning phase of the works all original testing and commissioning paperwork should be kept and included within the O&M Manual.

32.0 Drawings

Drawings form a large part of the design of the mechanical and electrical systems; the drawings should convey all information relevant to purchase materials and progress with installation.

32.1 Preliminary Drawings

Preliminary Drawings are the initial drawings for a project prepared by the design engineers during the early planning or promotional stage of the building design. These drawings will provide a means of communication between the designer and The Highland Council. These drawings will NOT be used for construction, but they will be used for exploring design concepts, preliminary cost estimates, approval by The Highland Council, and a basis for the preparation of finished construction drawings.

32.2 Construction Drawings

Construction drawings or working drawings are used by all involved in a project to work on the actual construction or installation of the design. These drawings will provide all the specific information, both graphic and written, about the project.

A set of construction drawings will be provided prior to works commencing on-site.

32.3 As Installed Drawings

After the completion of a project the contractor has a responsibility to provide accurate as installed or record drawings of the services installation in its completed state to The Highland Council.

An accurate record of the building services should be marked up on a master set of drawings by the contractor during installation, and updated with any changes which arise so that upon completion of the project there is a full set of marked up drawings ready to be turned into As Installed drawings, without delay.

When an accurate representation of the services installation is provided to The Highland Council this ensures that The Highland Council can benefit from efficient and cost effective future facilities management.

As Installed drawings must be provided to the council within the O&M Manuals on the day the completed project is handed over to the council.

33.0 Valuations / Claims

As the project progresses the sub-contractors will be required to provide monthly valuations to claim the ongoing cost of materials and labour. These valuations will be assessed against on-site progress to ensure that they are accurate and fair.

33.1 Contents of valuation / claim

The contract valuation will include all labour and materials used until the last day of the month of the valuation.

Should the valuation have to be submitted prior to the month end then an estimate of work and labour up until the month end will be accepted; as long as the estimate is deemed achievable.

33.2 Materials and goods unfixed or off-site

The decision to pay for materials and goods off-site or unfixed will be made by the Contract Administrator.

34.0 Tender Submission Requirements

34.1 Compulsory Design Tender Documents & Information

The following documents must be included within a Highland Council Design Tender submission –

- Full set of preliminary drawings
- Full system design information & materials/plant spec. included on drawings (Complying fully with all Regulations, Guides, Design Requirements, Specifications, Policies & Procedures etc. detailed within this document)
- Energy Performance Certificate
- Simplified Building Energy Model (where relevant)
- Fuel Options & Running Costs Appraisal
- Information on Spares
- Information on Specialist Tools
- Environmental Health information; location plans & elevations, dimensional information, distance from technology to boundaries and noise frequency information (where applicable).

Important Note: JCT Practice Note 6 – Main Contract Tendering, must be followed when submitting a design tender to The Highland Council.