MANCHESTER'S ENERGY STRATEGY

For 2005 – 2010

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1. Introduction

1.1 Why do we need an Energy Strategy for Manchester

1.1.1 Energy is vital to our health, well being and economic growth. It heats our homes, powers the streetlights, enables us to travel and is the backbone to our economic prosperity. Without energy Manchester would be a very different place.

1.1.2 However, unsustainable energy use can cause harm not just to our environment but also to the City's economy and to the health of its residents. Unsustainable energy relates to the use of unrenewable fossil fuels and the waste of energy through poorly insulated buildings and the use of energy inefficient equipment.

1.1.3 It is estimated that Manchester businesses waste millions of pounds every year through energy inefficiency. Over 11,000 people in Manchester live in fuel poverty and there are 179 excess winter deaths in Manchester, a major cause of which is inadequate heating. The burning of fossil fuels in Manchester results in episodes of poor air quality and contributes to the global threat of climate change. It is therefore vital that Manchester adopts an energy strategy, which reduces the negative effects of unsustainable energy use. We also need to recognise the positive benefits of sustainable energy use. It is a potential growth market for Manchester businesses and one, which has synergies with the development of the Knowledge Capital.

1.1.4. Manchester's citywide energy strategy is befitting to Manchester's status as a World Class City. It is also the first immediate initiative by the Council in taking forward the agenda to promote the city's development to become the Greenest City in Britain. Moreover it shows the city's level of commitment to tackling the global problem of climate change. While climate change will have an effect on Manchester there are other communities, particularly those in developing countries, whose lives could be devastated by climate change. We have a moral obligation to these countries.

1.2 Environmental Impacts of Unsustainable Energy Use

1.2.1 The burning of fossil fuel releases carbon dioxide, which then accumulates in the earth's atmosphere. Carbon dioxide acts as an insulator and its accumulation has been linked to the rise in the world's temperature over the last 140 years. The rate of temperature increase has been accelerating and the 1990s were the warmest decade in recorded history.

1.2.2 In the last 50 years the earth's temperature has risen by 0.6^{o}C. An increase of 0.6 ^{o}C may appear small but this rise in temperature has resulted in flooding of coastal areas and crop disruption. Over the coming decades the level of disruption is likely to increase and some scientists predict by 2100 the world temperature will rise between 1^{o}C to 3.5^{0}C (Inter-governmental Panel on climate change). In Manchester this means that our summers will be drier and winters wetter. Trees and green spaces will be at risk of desiccation and high rainfall could damage fish stocks as high winter rainfall could wash fish out to sea. It has been said by some climatic scientists that climate change will alter the Gulf Stream and plunge the UK into Siberian temperatures, which would bring with it even more dramatic changes to our city.

1.2.3 Concentrating on conserving energy alone will not resolve the issue of climate change. Greater energy efficiency will help to resolve fuel poverty but it will not tackle the production of carbon dioxide from the burning of fossil fuels. Hence there is a need for environmental reasons to ensure that both renewable energy and energy conservation is promoted.

1.2.4 At present our use of energy in the UK is not sustainable. If the earth's resources were shared equally amongst everyone, a 'fair-share' world would be just under two global hectares per person. On a national scale, the UK has an average footprint of 6 hectares per person – if all the world's population had consumption patterns like us, then we would need two extra planets to sustain ourselves.

1.2.5 Conducting an environmental footprint analysis, quite simply, enables us to calculate how much land and sea is needed to provide us with the energy, and other resources we need to support our lifestyles. From this we can work out whether this load exceeds what nature can support and helps us judge how sustainable our lives are and what changes we need to make now and in the future to improve quality of life. The miles our food travels can add considerably to the eco footprint burden.

1.2.6 Many individuals and communities are in the process of calculating their environmental footprint as a first step to measuring the impact that they have on their local environment and reducing their environmental impacts and therefore their Footprint. There is an opportunity for Manchester to undertake an eco footprint both for the city and on an individual basis.

1.2.7 Burning of fossil fuels also produces pollutants such as nitrogen dioxide and particulate matter. The city is taking action to reduce the impacts of the pollutants from fossil fuel burning. However in the City Centre and along the main arterial routes,

pollution levels under certain climatic conditions do rise above national air quality standards.

1.3 Health and Social Impacts of Unsustainable Energy Use

1.3.1 There are estimated, by the University of Manchester, to be 11,000 households in fuel poverty in Manchester. People in fuel poverty cannot afford to heat their homes. They live in conditions where their level of comfort is severely affected by inadequate heating and insulation and also their health may be detrimentally affected. In Manchester there are an average of 179 excess winter deaths per annum, a major cause of which is inadequate heating. There is some evidence to show that elderly people who live in fuel poverty are more likely to suffer from falls and children in fuel poor households suffer more respiratory illness.

1.3.2 Those living in fuel poverty are more likely to live in homes without central heating and therefore they rely on expensive electric heaters or heating to one room only, which just exacerbates their situation. In addition the housing stock in Manchester is older than the average housing stock in the UK. This means that despite very substantial action by Manchester Housing, Manchester homes are often poorly insulated and again this adds to heating costs and causes more fuel poverty.

1.3.3 The number of Manchester residents living in fuel poverty is likely to rise over the coming decades as heating and electricity costs are predicted to rise. Ironically in the future those in fuel poverty may find that in the hotter summers they cannot afford to keep cool. The affects of high temperatures can be clearly seen from the recent tragedy in France where deaths occurred as a direct result of high summer temperatures.

1.3.4 Health can also be affected by poor air quality caused by the burning of fossil fuels (primarily from cars and freight vehicles). These pollutants can exacerbate attacks in asthma sufferers. Again hotter summers will cause more pollution episodes due to changes in climatic chemistry.

1.4 Economic Impacts of Unsustainable Energy Use

1.4.1 It is estimated by the University of Manchester that businesses in Manchester could save up to £17million through energy efficiency improvements. Some of these improvements would require very little capital investment. The degree of the financial impact of this waste of energy is set to increase with the introduction of emissions trading. Furthermore our competitiveness in European markets could be affected by our

inefficiency particularly if mainland Europe is more energy efficient than us.

1.4.2 Unsustainable energy use in the domestic sector also has a negative effect on the local economy. If homes were better insulated and less money was spent on heating then this money could be spent in the local economy. It is estimated that for every pound saved through energy efficiency, up to 30p is spent in the local economy.

1.4.3 However, the situation is not completely bleak. The move from unsustainable energy to sustainable energy provides a wealth of business opportunities. Ethical investment is an opportunity for investment banks, particularly those which are based on co-operative principles. There could also be major opportunities in the specialist consultancy/scientific sector, which fits very well with Manchester's status as the Knowledge Capital.

1.4.4 Some businesses in Manchester are already working in the energy industry. These businesses are likely to benefit from an increased focus upon sustainable energy use, provided that they are flexible enough to adapt to the new energy agenda.

1.4.5 There are also job creation opportunities from the installation of sustainable energy. Long-term unemployed people, especially those with a background in manufacturing, are especially well placed to benefit from increased demand for workers in the energy efficiency industry. This is an opportunity for Manchester.

1.5 Scope of the Energy Strategy

1.5.1 The subject of energy is very broad in its scope. Energy touches everyone's lives and this strategy covers all facets of energy use and generation with one exception.

1.5.2 This strategy does not seek to address the steps, which may be necessary to manage the effects of climate change in Manchester. The strategy will seek to reduce unsustainable energy use and therefore should reduce Manchester's impact on climate change. However, the measures required to physically address climate change risks such as increased flooding or green space desiccation should be addressed in other plans, such as the Council's Development Plan. Despite actions at a local, national and international scale, a certain degree of climate change seems evitable. Planning for climate change is less about strategic decision making and more about ensuring that practical measures are implemented to reduce its harmful impacts. The Council and other agencies need to ensure that

climate change is part of their future contingency and development plans.

1.6 Timescale of the Strategy

1.6.1 In order to be effective the energy strategy will need to make an impact in the short, medium and long term. However, this document is bound to become dated in terms of the technological and scientific data/information. It is proposed that this is a 5 year strategy as it is viewed that after 5 years a complete review of the information in the strategy will be necessary. However, many of the actions in the plan may well continue after a 5 year time span. In addition to the complete review in 2010 an annual review of the action plan will take place to ensure that actions take account of technological and scientific changes.

1.7 Sustainable Energy Use in Manchester

1.7.1 The negative impacts of unsustainable energy use are patently clear. Therefore the energy strategy should aim to ensure that energy use in Manchester is sustainable. However, in order to determine the specific objectives and actions that are necessary to achieve this high level aspiration we need to understand more about the practical steps which would enable the City to achieve sustainable energy use. Therefore as part of the development of the strategy a baseline study was undertaken to:-

- map out current energy use and means of energy generation in Manchester
- chart progress to date in Manchester in reducing unsustainable energy use
- identify opportunities for the future
- identify best practice
- determine stakeholder views

The baseline study also includes an overview of the types of renewable energy sources currently available and their applicability to Manchester.

Key Findings

Social, economic and environmental affects of unsustainable energy use are likely to worsen over the coming decades

Energy inefficiency costs business in Manchester over £17 million every year, and if energy prices increase this cost would rise significantly.

Reductions in unsustainable energy use can contribute to cleaner air.

Growth in the sustainable energy sector can contribute to the Knowledge Capital.

2. Baseline Analysis

2.1 Energy Use in Manchester

2.1.1 In considering energy use it is important to remember that high energy use does not necessarily mean that this energy is being used inefficiently. Inefficiency can only be determined by studying each individual property. Obviously this is not feasible as the cost of the survey would be prohibitively high and funds would be better spent on actual improvements to conserve energy. Therefore the energy use figures given below provide some useful background information, but conclusions from this should only form part of the strategy development.

2.1.2 All the figures stated in this section are estimates by the University of Manchester. Energy suppliers are under no obligation to provide data on the level of energy use. The Department of Trade and Industry (DTI) have been working towards requiring energy suppliers to disclose energy use data. Through the Council's air quality data base the emissions of carbon dioxide for major companies can be determined. However in calculating the carbon dioxide emissions for the city estimates have had to be used. Continued work with organisations such as the DTI will be required to press for more detailed actual energy use (from which carbon dioxide emissions can be estimated).

2.1.3 The current overall energy consumption for Manchester is estimated by the University of Manchester to be 13.63 TWh (this is enough energy to make 5,000 trillion cups of tea). The breakdown of energy consumption for Manchester is:-

Commercial premises	37%
Housing	35%
Transport	21%
Public sector	6%

2.1.4 In a year residents and business in Manchester spend over £200 million on energy. The most expensive form of energy is electricity. Householders spend £37 million on lighting and electric appliances (which accounts for 13% of the energy use) compared to £38 million on space heating, which accounts for 57% of the energy use.

2.1.5 In Manchester, almost 60% of properties are pre-1945. Older houses use more energy than newer properties as the loft and walls are often not insulated or expensive to insulate, they are single glazed, and the property maybe difficult to draught proof.

2.1.6 In Manchester there are over 20,000 commercial premises. Of these, 31% are offices, 29% shops, 11% warehouses and 10% are factories (the remaining 19% includes premises such as restaurants, launderettes and garages). It is estimated by the University of Manchester that factories consume 27% of the energy and warehouses 14%. Offices and shops use less energy per premise but they still make a significant contribution to the energy use in the city, at 30% and 21% respectively.

2.1.7 The public sector (including the hospitals, all civic property and university buildings) accounts for 6% of the total use. The two distinguishing features of this sector is that the hospitals use coal for 67% of their energy supply and the universities have a relatively high use of electricity. Coal when burnt releases more carbon dioxide than gas. The coal-fired boilers in the hospital are to be replaced in 2007.

2.1.8 In the domestic and commercial sectors energy use is stable (the improvements in energy efficiency are being offset by an increase in energy use arising from household growth and greater use of technology such as PCs and air conditioning). However, in the transport sector energy use is growing significantly year on year.

2.1.9 Not surprisingly car use accounts for 92% of the energy used for private travel while in the freight sector lorries account for 83% of the energy used. It has been particularly difficult to estimate the impact of the airport on Manchester's energy use as it is a regional facility. However there is no doubt that air transport is an area where growth has added to Manchester's overall energy demand. In terms of reducing unsustainable energy use it is the transport sector which represents the greatest challenge.

2.2 Progress to Date in Reducing the Unsustainable Use of Energy in Manchester

2.2.1 In response to the Home Energy Conservation Act 1995, the Council has been monitoring and reporting the use of energy in the domestic sector over the last 8 years. Energy efficiency has improved by 14.27% compared to the 1995 baseline (this progress is comparable to other cities). 1% of the 14% improvement is estimated to have been achieved through increased awareness by householders of the need to conserve energy. The Housing Investment Programme has helped to improve energy efficiency in Council owned dwellings through improvements such as cavity wall insulation and loft insulation and new efficient central heating boilers. To date the vast majority of cavity wall insulation and loft insulation in the Council

stock has been undertaken. There are two district heating schemes, which serve several thousand properties. Applications for government funding to extend and enhance these schemes have been submitted. There are three district heating schemes, which serve several thousand properties.

2.2.2 These schemes were initially set up as combined heat and power schemes (CHP). CHP is explained further in Appendix 1. The schemes involved gas turbines that provided heat and electricity, local homes were provided with heat and the electricity produced was sold to the general network. As electricity prices fell the scheme no longer became economically viable and currently the schemes are now just run to provide heating. The schemes could be run again as CHP schemes if the price of electricity increased, as it is likely to do. This experience shows us that CHP based on gas and selling electricity to the network is not currently viable. In order to improve the viability of CHP it would be better to sell the electricity through a local network rather than to the grid and to have a fuel source that is low cost such as biomass, see Appendix 1.

2.2.3 During the process of stock transfer and PFI improvement programmes for the public sector housing stock energy conservation work is specified within the negotiations. Such works can include loft insulation, cavity wall insulation, double glazed windows, and condensing boilers.

2.2.4 In addition a free advice line through the Energy Efficiency Advice Centre (run by MCC) has been set up for tenants and home owners which focuses on giving practical advice to improve energy efficiency. The advice line also helps residents to obtain grants to improve the energy efficiency of their homes. Under the Energy Efficiency Commitment Programme all the energy providers (such as Scottish Power and Powergen) are required to provide grants for householders to improve the energy efficiency of their homes and Manchester City Council facilitates the provision of these grants. Government grants are also available for elderly residents and those in receipt of benefits. Grants are targeted to those most in need. Front line health and social care staff have been trained to identify those whose health is affected by cold, damp housing and refer these priority cases to the City Council. In addition more generalised marketing campaigns have been undertaken by the Council to raise awareness of the need to use energy efficiently. Further details about the measures to tackle fuel poverty are detailed within appendix 2.

2.2.5 In the private sector a number of new sustainable developments have recently been constructed. The Green Building (a multi-

storey apartment block in the city centre) incorporates renewable energy including photovoltaic cells and a small wind turbine. Urban Splash has recently invested in a development where all the energy needs of the residents can be fulfilled by a highly efficient combined heat and power plant. In East Manchester Lovells are providing micro CHP in new properties. (see Appendix 1 for further details.) All of these innovative schemes have been led by the developer. It is apparent that these developers believe that the incorporation of sustainable energy features in their designs adds value to the development.

2.2.6 In the business sector there are some isolated examples of progress. Some organisations in Manchester, such as the University of Manchester and Manchester City Council have been accredited in the UK Energy Efficiency Accreditation Scheme administered by the Carbon Trust. In the UK there are two hundred members. There may be other organisations in Manchester that have made progress. However without this external accreditation the exact level of progress cannot be gauged accurately.

2.2.7 Purchase of green electricity (electricity produced from renewable sources) has been undertaken by some organisations in Manchester. The City Council has been particularly successful in its approach and all street lighting and all electricity used in Manchester City Council's 800 operational buildings is green energy. This green electricity is generated outside of the City boundaries. The Council has developed its own energy policy to promote this approach that is detailed in Appendix 3.

2.2.8 In the transport sector energy use could be reduced if more journeys were taken on foot, by cycle or on public transport. More sustainable transportation is defined in a hierarchy from: walking and cycling, public transport, car share, motorbike and, lastly, single occupancy in a car. In Manchester cycle routes have been implemented and public transport in Manchester is being improved. The Metrolink has been proven to have a significant impact on reducing the number of trips made by cars in the city and therefore has contributed to the sustainability of Manchester's energy use. The Metrolink system carries 19 million passengers per year and is estimated to have removed over 3.5 million car journeys per annum from Manchester's roads with some road corridors which parallel the Metrolink alignment witnessing traffic reductions of up to 10%. The proposed phase three extensions are forecast to remove an additional 5.6 million car journeys from the local highway network.

2.2.9 Quality Bus Corridors have been introduced across the city with the implementation of a series of measures to help not only

buses but also passengers, cyclists and other vulnerable users within an area. Much of this investment has been augmented by complementary funding from other sources to maximise regeneration benefits. Bus companies are gradually introducing more modern and low emission vehicles on QBC routes to complement this investment.

2.2.10 One means of influencing travel choices is through Travel Plans (TPs). TPs are introduced by companies and other organisations that seek to encourage their staff to use more sustainable means of transport. The City Council has established a dedicated Travel Change team, who lead on providing support and guidance to organisations across Manchester who wish to develop and implement TPs. In addition to targeting large employers, the Travel Change teamwork with Manchester schools to develop individual TPs, adopting a co-ordinated approach to bring together the work of a range of different departments and partners. Examples of where external organisations have successfully implemented TPs include the Highways Agency in Manchester that now has 85% of staff travelling to work by walking, cycling, public transport or car share. They have achieved this by removing a quarter of their car parking spaces; and requiring payment of car parking, unless car sharing is being adopted. In addition Manchester Airport also recognises the environmental impact of its operations and has sought to increase the use of public transport by both its staff and airport users.

2.3 Energy Generation

2.3.1 Currently only 3% of the energy used in Manchester comes from renewable sources. The majority of electricity used comes from large-scale coal and gas power stations, which supply power to the national grid. Distribution via the national grid can result in energy losses of between 5 and 10%. Space heating in the domestic sector is mainly provided by gas.

2.3.2 Some of Manchester's power is derived from nuclear power stations. Nuclear power is a renewable energy resource. However the not inconsiderable legacy of radioactive waste from the energy production process makes this option environmentally unsustainable in the long run. Nuclear power stations are now being decommissioned.

2.3.3 Current freedoms for domestic customers mean that energy suppliers cannot guarantee that a customer will remain with them. The 28 day rule means that any domestic customer can switch their supplier with only 28 days notice. This ability to switch supplier has reduced the attractiveness of the energy

market for small-scale local suppliers. In addition the National Grid and Regional Electricity Companies can charge for use of the distribution network, which deters small-scale generators from entering the market.

2.3.4 A change to more renewable sources of energy will demand a very different approach to generation, distribution and storage of energy. Renewable energy in the main tends to be on a small scale and could be supplied through localised distribution. As renewable energy can vary in its generation rate energy storage will become very important in order to balance peaks and troughs in generation.

2.3.5 It is estimated that by 2020 75% of the UK's energy resources could be imported. Security of supply will therefore become more of a pressing issue. This change tends to show the importance of localized supply.

2.4 Opportunities to Reduce the Unsustainable Use of Energy in Manchester

Through Improvements in Energy Efficiency

2.4.1 Improvements in energy efficiency can reduce the unsustainable use of energy in Manchester. In the housing sector the most significant energy saving can be achieved through cavity wall insulation. More heat is lost through walls than any other way, about 1/3 in an un-insulated home. It costs approximately £350 to undertake cavity wall insulation and the payback period is 3 – 4 years. Grants for the work are also available for some householders. There is an added benefit to cavity wall insulation in that during hot spells the house will be cooler. However, some properties with cavity walls are not appropriate for this treatment.

2.4.2 At present the energy efficiency improvements in Manchester have led to a 14% improvement on 1995 figures; however by 2010 Manchester is meant to have achieved a 30% reduction. It has been estimated by the University of Manchester that it will cost £190 million to achieve the 30% reduction by 2010. Manchester Housing's plans to improve energy efficiency include the provision of cavity wall insulation, loft insulation, new efficient condensing boilers and innovative solutions to insulate the hard to treat homes in the City. However the major improvements necessary can only be fully achieved through increased capital investment. The significant issue of fuel poverty is being addressed by the City through the development of an affordable warmth strategy which is outlined in Appendix 2.

2.4.3 BREEAM (The Buildings Research Establishment Environmental Assessment Method) is a rating system that is used to assess the environmental sustainability of new developments. Credits are awarded based on the performance of buildings in the areas of: energy use, transport, pollution, materials, water use, landuse, ecology and health and well-being. A set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of PASS, GOOD, VERY GOOD or EXCELLENT, and a certificate awarded that can be used for promotional purposes. BREEAM has specific schemes to assess the environmental impacts of new houses, offices, schools, industrial units and retail developments and other developments can be assessed using a bespoke version of BREEAM.

2.4.4 In the new development guide which is still in draft the city council is proposing that all new develops in Manchester should achieve a minimum of “very good” at the post construction phase and and encourages developers and designers to consider environmental sustainability issues at the earliest opportunity.

2.4.5 In order to promote home energy efficiency Manchester is currently developing an EcoHouse. This demonstration project incorporates the latest energy saving design and technologies and are used as an educational resource and awareness raising facility. We must not under estimate the potential impact of raising awareness of energy conservation. It has been estimated that if everyone in the UK turned their TV off as opposed to leaving it on standby overnight we would save enough energy to decommission 2 power stations. While PC monitors use 80% of the energy consumed by a PC, energy would be saved if monitors were switched off when they are not in use.

2.4.6 Combined heat, and power (CHP), represents a way of saving energy through far greater efficiency. CHP produces twice as much useable energy for an equivalent amount of input fuel than conventional power stations. Appendix 1 gives further details about CHP. Whilst the current low price of electricity and gas is a deterrent to CHP, in future likely price rises will make it more viable. There are hundreds of CHP systems in the Netherlands and 30% of electricity in the Netherlands is based on small scale local CHP; by comparison in the UK it is just 2.5%.

2.4.7 It is estimated by the University of Manchester that if all the businesses in Manchester were to reach best practice in terms of energy efficiency then 28% energy savings could be made (over £17 million per annum). However this would cost over £90

million to achieve. Obviously businesses have a continual cycle of improving their plant and buildings; however at the normal replacement rates for buildings and equipment it would take 100 years to achieve the 28% improvement.

2.4.8 In determining the benefits of capital investment businesses need to be satisfied that the pay back period is financially acceptable to them. Pay back time is simply the length of time over which an implemented measure pays for itself. Small and Medium-Sized Enterprises would usually consider a payback time of a few years as appropriate. Some more capital-intensive industries would accept pay back times of 7 to 10 years. A £90 million investment would have a 5 year pay back so the acceptability of this level of investment will only become acceptable for the majority of Manchester businesses as the pay back period reduces through fiscal measures.

2.4.9 Although businesses in Manchester may not be able to achieve best practice they still can make considerable energy savings almost immediately. It is estimated that businesses could save 3% in energy costs (£1.84 million) by implementing an energy policy and monitoring energy use and raising staff awareness. A further 4% could be achieved through regular maintenance of equipment and controls. So a total of £4.3 million could be saved with very limited expenditure. The main barrier to making these improvements is lack of knowledge and more critically lack of commitment. A business has to want to save energy and see that this is important both to the business and the environment – it also needs knowledgeable individuals to ensure that practical improvements are implemented.

2.4.10 Businesses are increasingly keen to install air conditioning units which leads to more carbon dioxide emissions. An alternative to this is natural ventilation. Natural Ventilation Systems use air movements caused by the natural forces of temperature and wind to deliver fresh air and control the internal working environment of a building. They eliminate the need for mechanically vented air conditioning and therefore reduce carbon emissions as well as reducing a building's running costs. The specific approach and design of a natural ventilation systems will vary based on building type and local climate, but systems will utilise fundamental concepts such as the stack effect (the natural buoyancy of hot air to rise and exit a building through high level vents), cross ventilation (using façade vents to transfer fresh air laterally across a building) and passive cooling – designing to absorb heat build up during daytime usage. Natural Ventilation Systems are ideal for buildings where the client is looking for ventilation systems with low capital costs and zero running costs. Hybrid systems also exists which combine natural ventilation strategies with electric fans. These

do not provide all the energy saving benefits of natural ventilation, but do allow designers to reduce the number and size of vents and opens. Also systems based on re-condensing principles are more energy efficient. There is an opportunity to promote the integration of natural ventilation systems into the design of the City's new buildings.

2.4.11 There may also be opportunities for the Commercial Sector to reduce carbon dioxide emissions through the purchase of green electricity (electricity from renewables). Green electricity is becoming more financially advantageous due to changes in the taxation system.

2.4.12 The public sector is characterised by old building stock, which can be difficult to insulate. This emphasises the need to ensure that during new build and major refurbishment the highest standards in terms of both energy efficiency and renewables must be met. The Building Schools for the Future programme is a great opportunity to improve energy efficiency. The integration of renewable energy into schools has a potential educational value.

2.4.13 The most significant challenge in reducing unsustainable energy use is in the transport sector. There are ambitious modal shift targets within the Local Transport Plan, and the City Council is currently negotiating a local PSA target with Government to increase the % of trips to the City Centre during the morning peak to 62% by 2008, from a baseline of 59%. However Greater Manchester Passenger Transport Authority/Executive and the Council cannot force people to stop driving by private car. Convenient reliable and high quality public transport must be in place in order for people to switch from making journeys by car. It is therefore of critical importance that the proposed Metrolink extensions are implemented – no one other single measure could make such a positive impact to reduce unsustainable energy use in the transport sector.

2.4.14 This is the sector where the opportunity for change now lies within the hands of the people of Manchester. Business does have a role to play in facilitating a change in the current trend. Travel plans have undoubtedly worked and there is further scope for this initiative and resources have been made available by the Council to facilitate more uptake of this idea. The Transport Thematic Partnership, within the Manchester LSP framework, is facilitating and supporting projects run by a range of delivery agents aiming to encourage modal shift. However, there is also a need to make the link between travel and climate change through general awareness raising. For example, freight travel is also a major area of energy use and again there needs

to be greater awareness about the link between the purchase of non local produce and climate change.

2.4.15 New fuel types of vehicle power such as hydrogen cells and electric powered vehicles all could help to reduce the emissions of carbon dioxide from the transport sector. Vehicles powered by hydrogen fuel cells are a particularly exciting development. The combustion of the stored hydrogen produces only energy and completely innocuous water vapour. However there are some practical problems with this power source. Firstly hydrogen stored under pressure is potentially explosive, secondly at the moment the cells are nearly as big as a car, thirdly hydrogen is very permeable and may well leak out from the storage cells over time. Fourthly, the cost is very high; recently four hydrogen-powered buses have been used in London, at a cost of £1 million each. On a commercial level hydrogen powered vehicles are 10-15 years away. Some concern has also been raised that the production of hydrogen will result in high carbon dioxide emissions, while hydrogen appears an exciting opportunity for the production of a clean fuel there are obviously technological issues which fuel companies are currently working on resolving. Electric powered vehicles are a much more tested technology but are not commercially economically viable from a commercial perspective at this time. In the long term the need to travel can be reduced through mixed use development.

2.4.16 However, reduction in carbon dioxide emissions cannot just be achieved through energy efficiency improvements. Energy efficiency does not address the unsustainable use of fossil fuels. While in the domestic sector financial savings from energy efficiency measures may well be used on greater thermal comfort. Renewable energy therefore should be considered as part of Manchester's approach to achieving sustainable energy.

Opportunities to Reduce the Unsustainable Use of Energy in Manchester Through Renewable Energy

2.4.17 There is, at present, very little renewable energy generation within Manchester itself, though some Manchester organisations do purchase green electricity generated outside of the Greater Manchester boundaries. Appendix 1 provides some background information about the pros and cons of the different types of renewable energy sources and their application to Manchester.

2.4.18 Wind power is the only economically feasible renewable power source for the UK at the moment. Other sources such as photo voltaics have a 90 year payback period. At present due to the

low price of electricity and gas and the relatively high costs of new renewable energy technologies large scale renewable energy generation is not economic in Manchester.

2.4.19 In terms of carbon dioxide emission reduction per pound spent, there is far greater value at the present time in conventional energy efficiency activities than in renewables. This is also a reflection of the generally low energy efficiency of many buildings. However, investment in renewables should not be assessed purely in economic terms: there are further social and environmental reasons for promoting some forms of renewable energy within Manchester. Furthermore, over the next decade the capital costs of renewables will reduce and the cost of electricity and gas will increase. Some examples of the 'niche' market opportunities for renewables within the city itself are as follows:

- Use of Photo Voltaic cells in place of granite or other expensive cladding materials for commercial buildings
- Use of biofuels such as woodburning boilers in suitable council-owned or other buildings.
- Use of biofuels or other clean fuels for the transport fleet.
- Use of small wind turbines on suitable buildings or available brown-land, in part as a gesture that in Manchester we are responding to the need for more renewables (currently wind farms are facing opposition in rural areas).
- Geo thermal uses the heat within the earth to provide space heating and hot water. The cost for a domestic dwelling would be £7,500 so at present it is a costly option but one that may well suit demonstration projects.

2.4.20 In terms of financial viability it is likely to be more cost effective to rely on renewable sources to provide just part of the energy demand for a building, with power from the national grid to provide for peaks in demand.

2.4.21 We should recognise the problems that companies such as Powergen have had in installing wind farms in rural areas. If we are to take a leadership role in sustainable energy as part of Manchester's status as a World Class City then a commitment to wind power would be a radical step.

2.4.22 Wind power can be architecturally innovative and wind turbines could be a unique selling point to Manchester's skyline. Obviously the aesthetics of wind turbines is a matter of great debate and the overriding principal as with any built structure in Manchester is that it should be of outstanding design quality.

2.4.23 Heat and power generation from waste is another future opportunity. This type of heat generation is often linked to

incineration schemes which have a high degree of public unacceptability, However other technologies such as the anaerobic digestion of waste to produce methane to burn in boilers maybe more locally acceptable. There is a potential for synergy between this strategy and the Greater Manchester Waste Strategy, which supports the use of new technology to reduce the environmental impact of the waste stream. The GM Waste strategy proposes that waste will be treated in mechanical biological treatment plants which will produce refuse derived fuel (RDF). This can provide a fuel stock for power stations which is completely renewable.

2.4.24 In the transport sector biodiesel is the only truly renewable fuel source. Biodiesel is widely available in the US and in the UK there are a few recent success stories. Some garages have started to sell biodiesel. Business cases are being prepared by a number of organizations to produce rape seed for fuel production on a commercial basis and there are facilities in the North west where this oil can be refined. However, vehicle manufacturers still have concerns about the use of biodiesal in their engines and often its use will invalidate the vehicle warrantee.

2.4.25 Biodiesel – like other biofuels – is a renewable source of energy made from plants. It is very much like traditional (mineral) diesel used in cars, buses and lorries, but instead of being produced from non-renewable fossil fuels it is made from plant oils such as peanut, sunflower and rapeseed oil as well as from waste cooking oil.

2.4.26 Despite its environmental benefits, the use and acceptance of biodiesel in the UK lags behind other European countries. There are issues of supply, particularly to individual drivers, and still relatively few local authorities are specifying biodiesel for their fleet vehicles (Southwark, York and Cheshire County Council being amongst these few). The government's tax reduction of 20p per litre of biodiesel from April 2002 should encourage the use of biodiesel on a larger scale and locally the research carried put by Manchester Biodiesel Coop will raise awareness of biodiesel as an important fuel and address some of the barriers that face its expansion. The co-op is keen to encourage other cities to start their own co-op and join a National Network, which will link in with local registered bio diesel producers, so promoting the use of the fuel as a realistic alternative to diesel across the country. They are currently researching opportunities to set up waste vegetable oil collection points across Manchester and to provide employment opportunities through supporting the development of social enterprises.

2.4.24 Finally it needs to be stressed that renewable energy does not have to be produced within the city boundaries and Manchester can be an importer of green electricity. The Council has been successful in purchasing renewables for its own energy supply and this success should be promoted to other energy users in the City. The Council's internal energy policy is attached as appendix 3.

Key Findings

There has been some progress in sustainable energy in Manchester but there is considerable opportunity for further action

It is more environmentally and economically valuable at present to invest in energy efficiency than renewables; however there is a place for high profile renewable energy demonstration projects

Current market forces make it difficult for small scale generators to sell power to the national grid

There are opportunities for bulk purchasing of renewable energy

That energy use in the transport sector is growing – there is a need to raise awareness in this sector

3. Policy and Legislative Context and Support Mechanisms

3.1 Introduction

There has been considerable debate at an international level as to the validity of predictions that climate change will lead to a rise in temperatures of between 1 ^{o}C and 3.5^{o}C by 2100. This debate is still ongoing; however, the majority of nations now accept that there is a need to make cuts in carbon dioxide emissions based on the precautionary principle and that the lack of full scientific certainty should not postpone measures to cut emissions.

3.2 European and UK Policy

3.2.1 In the UK this precautionary principal is encapsulated within the Energy White Paper – "Our Future Creating a Low Carbon Economy" 2003. This White Paper has four principle aims:-

- Achieving a 60% cut in UK carbon dioxide emissions by 2050
- Ensuring reliable energy supplies
- Creating competitive markets
- Elimination of fuel poverty

3.2.2 This long term aspiration is backed up by number of short term goals. The short term goal for the UK is to cut emissions of carbon dioxide by 20% by 2010 (10% saving made through improved energy efficiency – including combined heat and power and 10% achieved through the use of renewable energy resources).

The White Paper proposed that this will be achieved through:-

- More local and community renewable energy schemes fuelled by wind/biomass.
- Increased energy efficiency
- More micro and mini electricity generation using combined heat and power
- Increased solar heating systems.

3.2.3 The White Paper proposes that these changes can be achieved through a combination of fiscal and legal controls together with a range of support mechanisms provided by agencies such as the Energy Savings Trust.

3.2.4 In 2006 the European Union intend to introduce a compulsory energy rating scheme for public buildings. This will mean that every public building will need to be surveyed and the rating will

be publicised. This approach could potentially shame some organisations into improving the energy rating of their buildings.

3.2.5 In terms of the transport sector there are high level targets at an EU level which the UK have signed up to. The EU is aiming to achieve these targets through voluntary agreements with the automotive industry. By 2008 they hope to have reduced the carbon dioxide emissions from new cars to below 25% against 1995 levels.

3.3 Government Fiscal Controls to Stimulate the Renewables Market and Improve Energy Efficiency

3.3.1 The main fiscal controls to stimulate the renewables market and improve energy efficiency are the Climate Change Levy (CCL) and the Renewables Obligation (RO).

3.3.2 The CCL was introduced in 2001 and through taxation raised the energy costs of commercial companies. This revenue was then used by Government to fund both a reduction in national insurance and provide business grants to support sustainable energy initiatives (managed through an organisation called the Carbon Trust). The basic concept was to tax environmentally harmful effects and give economic incentives to positive socio-economic benefits such as employment. Energy from renewable sources is tax exempt therefore CCL should have stimulated development of renewable energy. However there is no sign that this has happened to any great degree; due mainly to the slow progress in terms of installation of wind farms.

3.3.3 The RO requires energy suppliers to purchase increasing proportions of their energy from renewables in order to achieve the government's 10% target by 2010 and potentially 20% by 2020. If they cannot meet this target then they will need to buy Renewable Obligation Certificates (ROCs) from renewable energy suppliers – this is sometimes referred to as emissions trading. Overall this should increase long-term funds for the production of energy from renewable sources. At present only 3% of energy is generated by renewable resources so demand is likely to outweigh supply.

3.3.4 Fiscal controls have been used within the transport sector such as changes in the vehicle taxation charges and company car taxation.

3.4 Legislative Controls

3.4.1 Under the Home Energy Conservation Act (HECA) 1995 local authorities are required to improve energy efficiency of their

housing stock by 30% by 2010; this target is against a 1995 baseline figure. This is a demanding target and to date Manchester has achieved 14%. Thermal comfort is one of the requirements under the decent homes standard and the City has met the Government's 2004 interim target for public sector through the investment of energy efficiency measures. In addition to this, the investment generated through localised stock transfer should enable improvements to be made in energy efficiency.

3.4.2 The Government has recently consulted on changes to the Planning Policy Guidance in relation to renewable energy. If the amendments are brought in, local authorities would be required to:-

- Set out criteria for assessing renewables (which must not be restrictive unless there is reasoned justification)
- Consider wider environmental and economic benefits of renewables when determining planning applications
- Not judge applications on outdated technology
- Promote community understanding and acceptance of renewables

3.4.3 Furthermore the consultation document suggested that regional targets should be set for renewable energy as a percentage of the total energy use. The draft Regional Planning Guidance (RPG) for the North West suggests that the North West adopts the national standard of 20% cut in carbon dioxide by 2010. The revision of national guidance of the RPG is a step forward and gives a strong steer to acceptance of renewable energy applications. However, there is still no statutory requirement on developers to source a percentage of their energy from renewable sources.

3.4.4 The Building Regulations have also recently been revised and these regulations now require that office buildings do not emit more carbon dioxide than is typical of their class. Further amendments to this legislation are likely as the term "typical" is hardly going to bring about significant improvements in the thermal standards of new buildings.

3.4.5 The Greater Manchester Passenger Transport Authority/Executive (GMPTAE) have responsibilities to develop strategic transport policies and facilitate investment in transport infrastructure across Greater Manchester. This includes assessing the transport needs for Manchester, and ensuring that provision is adequate and meets appropriate criteria. In undertaking these assessments there is a requirement to ensure that the Local Transport Plan achieves air quality targets this places further emphasis on schemes that promote sustainable

transport. The legislative system restricts the ability of GMPTA/E to regulate public transport. This inhibits the leverage which could be applied to bring about swifter action to meet environmental, energy and air quality targets in the public transport sector. However provisions in the 2000 Transport act to enable Local transport authorities to introduce Quality Bus Contracts, which specify vehicle types, frequencies and fares in circumstances where the local bus strategy is not being delivered by other means, offer an opportunity to upgrade vehicle quality and performance standards. The Council is responsible for road infrastructure including cycleways and pedestrian routes and in fulfilling this responsibility, the Council undertakes work to facilitate and promote sustainable transport.

3.5 **Support Mechanisms**

3.5.1 The Energy Savings Trust (EST) was set up to help local authorities achieve HECA targets, and to give expert advice on saving energy and to raise awareness of the need to save energy. The EST acts as a central point for grant information, and provides advice on low energy use products. The EST works very closely with local authorities who administer a number of the EST's grant schemes. The EST also administers the Powershift programme which offers grant support for clean fuel vehicles. However, even with powershift grants vehicles powered by electricity and natural gas are still not economically feasible.

3.5.2 The Carbon Trust aims to accelerate the take-up of low carbon technologies and practices by business and the public sector. It is funded by £100 million from the Climate Change Levy. This funds research, as well as business support programmes. £70 million is available through the Enhanced Capital Allowance scheme, which is designed to support business investment in energy efficient technology.

3.5.3 Clearskies is an organisation run by the Department of Trade and Industry and Building Research Establishment to give householders and communities information and grants for renewable energy schemes. Householders can obtain grants of up to £5,000 while non profit making community organisations can receive up to £10,000 for feasibility studies and up to £100,000 towards the implementation of a viable renewable energy scheme.

3.5.4 For businesses in Manchester there are a range of organisations who can advise about energy efficiency; these include:-

- Groundwork Manchester through the Business Environment Association provides an array of business

support to help companies address their environmental performance.

- Chamber Business Enterprises –Offers in-depth environmental advice on a commercial scale for larger companies.
- Sustainability North West – Works with companies throughout the North West on Corporate Social Responsibility.
- Enworks – A branding for environmental business support throughout the North West, marketing the benefits of improved environmental performance and referring companies to their delivery partners.
- Envirowise – A national telephone help-line service, offering free fast track visits, delivered by Envirowise agents.
- Envirolink – Environmental information and support service for small to medium sized enterprises. (funded by the NWDA)
- Mersey Basin Campaign – Offering support and information to waterside businesses.

Funding is also available through the European Union schemes "Concerto" and Civitas". Rochdale and Oldham recently put in a bid for funding which was unsuccessful. Funding is reliant on having a partner from another City in Europe. The funding potential is vast, millions are available but considerable time is required to write the bids and develop partner alliances.

3.5.5 Forests for the Future is a registered charity that is attempting to reach out more to the individual. They encourage individuals and organisations to become carbon neutral. Through the sponsorship of tree planting any one can offset their carbon emissions through trees that will effectively mop up the additional carbon dioxide.

Key Findings

Policy in the UK is based on the precautionary principle

A wide range of funding opportunities exist.

Demand for renewables is likely to exceed supply

There is a great range of advice services and grants for businesses

There are opportunities for significant funding through European Union schemes.

4. Good Practice

This section contains case studies which show good practice in terms of achieving sustainable energy. These case studies include both public sector and business examples.

Case Study 1
Energy Efficiency Lead Approach

Newark & Sherwood District Council set carbon reduction targets as far back as 1992. Nearly all the properties in the district (c.46,000) have been surveyed and imaginative programmes for raising public awareness are in place. A 20% carbon dioxide reduction (in the Council stock) has been achieved in the past decade. The Council follows the notion of 'least cost carbon reduction' policies, with the priority to ensure that reliable and effective sustainable energy measures are achieved at least cost. Loft and cavity wall insulation and replacement of boilers form the cornerstone of the authority's sustainable energy efforts, and the Council provides a conducive planning environment for private sector and other players to experiment with more radically new technologies and approaches. The energy manager reports to three members of the Cabinet: the Council Leader, the Member responsible for estates and housing and the Member responsible for sustainable development.

Relevance for Manchester

- Need to set targets which are challenging but achievable
- Stretching targets can be achieved through very straightforward measures
- Need to recognise that energy as an issue which cuts across departments and disciplines.
- Need to create a conducive environment in which new technologies and designs are encouraged

Case Study 2

Combined Heat and Power in a Private Development

Urban Splash is currently working with a CHP developer in Altrincham which offers customers a 10% reduction in energy prices. Such a discount should secure customer loyalty despite the existence of the '28 day rule' which allows domestic customers to switch their supply of electricity and gas through giving 28 days notice.

This scheme is financially viable as the rate of return has been agreed as being 15 years, normally developers and investors would seek for a much shorter pay back time. In addition they have a large customer base (over 300 apartments) which have sufficient heat and power demands to make the CHP viable. To make the scheme more cost effective development is operating a top-up system from the grid at times of peak demand; this is more economic than installing a larger CHP capacity.

Relevance for Manchester

- CHP when viewed as a long-term investment can be financially viable for a private developer
  CHP can be more cost effective if used with national grid power to back up peak demand

Case-Study 3

Woking Borough Council – Independent Local Scheme

Woking Borough Council is the only local authority in the UK to supply customers with electricity on a private wire combined heat and power and renewable energy network. The Council established Thameswey Ltd. as a public/private partnership Energy and Environmental Services Company (EESCO). The company has installed CHP, thermal storage, absorption cooling with heat, photo voltaic cells, chilled water and private wire networks serving the Civic Offices, two hotels, conference and events centre, leisure complex and a multi-storey car park, all in Woking Town Centre. The system is stand-alone and 130% self-sufficient, with export of excess electricity to other council sites and housing. Carbon Dioxide emissions have been reduced by a massive 67%. The initial capital investment in 1990 was £250,000. A further £2.8m was invested to expand the scheme over 12 years. Over this time period £5m savings have been achieved with £970,000 now being saved per annum. Investment was provided through an ethical pensions fund.

Because the council owns the 'wires' of the local energy grid, it is exempt from distribution system charges and transmission loses are reduced as the network is localised. This means that it is able to provide a competitive price to customers. Thameswey Ltd. is now looking for opportunities to export the local-grid island-generation concept to other parts of the UK.

Relevance for Manchester

- The importance of being able to establish autonomy from the national grid.
- Local CHP schemes can be good for the environment, economy and society.

Case Study 4 – Mixed Use Sustainable Development

Bedzed is a new mixed use development in the London Borough of Sutton which has been designed as a zero energy building. It incorporates a combined heat and power unit which is able to produce all the development's heat and electricity from tree waste (which would otherwise go to landfill). The houses face south to make the most of the heat from the sun and have high standard of insulation and triple-glazed windows. Where possible building materials have been selected from natural, renewable or recycled sources and wherever possible brought from within a 35 mile radius of the site. A green transport plan aims to reduce reliance on the car by cutting the need for travel (eg through internet links and on-site facilities) and providing alternatives to driving such as a car pool.

Relevance for Manchester

- Sustainable energy in design can go further than just improved energy efficiency and on site renewables.
- Locally sourced materials and an approach to mixed use development can reduce carbon dioxide production.

Case Study 5

Commercial Exemplar

Manchester Airport has one of the most integrated public transport systems in the UK. In 1997, Manchester Airport published its Ground Transport Strategy, a comprehensive document setting out the mechanisms by which the airport will achieve its stated target of 25% of journeys to and from the airport (for staff and passengers) to be by public transport by 2005. In 1998, the Green Commuter Plan was launched. This promotes small changes by Airport staff to their travel behaviour and includes business travel, working from home, bus services and car sharing.

Relevance for Manchester

That there is good practice within the city that can be promoted to raise standards in other businesses

5 Stakeholder Review and Priorities

5.1 Partnership Approach

5.1.1 As part of the baseline study two a stakeholder meetings have been held which included a broad range of delegates from all sectors. At the stakeholder meetings, there was general support for an energy strategy for Manchester. Stakeholders felt that this should be achieved through partnership. However, there was some difference of opinion on exactly how the partnership should be formed. Some looked to the Council to take the leading role, whilst others saw other stakeholders as equally important in motivating action and strategy formulation. Some also noted that any partnership should aim to have clearly defined objectives and specific 'flag ship' projects, rather than just producing reports.

5.1.2 There was also general agreement that Manchester had to establish its own unique and distinctive energy strategy, which would set it apart from other cities which have been or are now developing sustainable energy plans. Several possible distinctive features mentioned were:

- Regeneration and sustainable energy: e.g. with the Millennium Village and large-scale East Manchester development.
- Drawing upon the technological history and skills of Manchester
- Realising the link between quality of urban life and sustainable energy
- Making the connection between sustainable energy and sustainable waste strategies

A Manchester Energy strategy and partnership might include:

- Contacts with the International Council of Local Environmental Initiatives (ICLEI) to identify cities which represent good comparisons with Manchester internationally
- Promoting 'success stories' in Manchester, e.g. CIS's promotion of sustainable energy (PV and design), MCC's Group Heating for Homes initiative.
- Drawing upon existing expertise as far as possible, e.g. Manchester Airport's carbon management programme.
- Assessing which of the data gaps in the scoping study could be filled and at what cost and whether that expense is worthwhile.
- Bringing transport issues more thoroughly into the sustainable energy agenda.

5.2 Practical Opportunities for the Future

5.2.1 The stakeholder group were asked to identify practical opportunities for the future. Overwhelmingly, the stakeholder group believed that sustainable energy needs to become associated with good quality development which is sought after by purchasers. If this happened there was considered to be a possibility that such innovative sustainable energy approaches might extend out to many other "mainstream developments". There is also the symbolic value of having sustainable developments within the City, since much publicity can be generated as has happened at BedZed in Sutton.

5.2.2 A representative of the Manchester Chamber of Commerce gave general support for the development of a sustainable energy strategy for the city. They felt that businesses are provided with sufficient opportunities for taking up energy efficiency advice and services, but are perhaps sometimes subject to too much 'hard sell' on the issue by environmental management organisations. The important thing from the Chamber perspective is that firms are able to respond to energy efficiency as they choose to be appropriate given their own circumstances.

5.2.3 In New East Manchester (NEM) the stakeholders saw the very high level of new build as presenting a prospect of requiring high energy efficiency and sustainability criteria. The requirement for environmental sustainability has already been included in the briefs being prepared for various construction and development activity. It was felt that Housing Market Renewal funding also provides an excellent opportunity for providing innovative solutions for integrating renewable energy into buildings, developing micro-grids, micro-CHP, district CHP, high energy efficiency standards, and integrated public transport solutions. NEM is engaged in discussions with various consultancies, experts and specialist developers on incorporating environmental sustainability in the regeneration planning.

5.2.4 The North Manchester Business Park at 160 hectares could be a further exciting opportunity for developing innovative solutions to sustainable energy. So far there is a major new £35 million public transport interchange being planned, however, there is no major initiative for a sustainable energy strategy for the Business Park beyond the adoption of up to date energy efficiency standards and measures.

Key Findings
Businesses are rather overwhelmed by the hard sell in relation to energy

Need for Manchester's energy strategy to be distinctive

New development offers the most significant opportunities to promote sustainable energy

6. Conclusions

6.1 Overview

6.1.1 The negative effects of unsustainable energy use are patently clear from the details given in Chapter One. The impact of unsustainable energy use affects the environment, economy and the social well being of the residents of Manchester. In order to offset these effects Manchester needs to implement an energy strategy that works to ensure that carbon dioxide emissions are reduced, that people can afford to heat their homes and that businesses maximise future opportunities and maintain competitive advantage. Due to the potential worsening of the situation, action needs to be taken urgently.

6.1.2 In many ways the achievement of sustainable energy use appears very simple. However, in amongst all the grant regimes, technical options and differing views about renewables the achievement of sustainable energy use seems to have become complicated – in fact overly complicated. Therefore in order to make rapid process we need clear targets, which are locally relevant and commit all energy users and generators in our city to taking action on achieving sustainable energy use and generation

6.2 An Energy Target for Manchester

6.2.1 The national target for carbon dioxide reduction is that carbon dioxide production will reduce by 60% by 2050 against a 1990 baseline. This is a challenging target which is reflected in the Council's more ambitious 'Greenest City in Britain' target to reduce city-wide CO_2 emissions at a rate exceeding 1% per annum.

6.2.2 Monitoring data will be essential for the tracking of our progress against any target. Some data on energy use and carbon dioxide emissions by larger scale users is already available and there are detailed estimates of domestic use. We can estimate traffic carbon dioxide emissions using an air quality modelling package and work is on going to estimate emissions from commercial premises. Through contacts such as the Carbon

Trust we will lobby for improved data sources so we can more accurately chart our progress.

6.3 Energy Conservation

6.3.1 It has been found that energy conservation is of key importance in tackling the unsustainable use of energy. At the time of writing this strategy it is more environmentally and economically valuable to invest in energy efficiency than renewables.

6.3.2 The most cost effective way of improving energy conservation is through awareness raising campaigns. There are opportunities to expand existing campaigns such as Eco schools and to use existing community engagement mechanisms such as ward co-ordination. However awareness is not the only gap. There are examples of where extensive publicity has still not resulted in an uptake of energy efficiency measures. Hence an approach needs to be undertaken that raises awareness and provides an incentive to change while making the changes as straightforward and as easy to adopt as possible. It is the same approach as mainstreaming recycling in that wee need to make change easy and keep the message about conserving energy going through lots of different media. There may need to be an element of experimentation to find out what measures work in terms of changing behaviour.

6.3.3 Awareness raising can also include the commercial sector who currently feel over whelmed by the range of energy saving advice on offer. There is evidence that local business would appreciate locally based accessible information from one source. A business pledge for Manchester has already been developed which has a strong emphasis on energy efficiency, this is a multi agency project which could be built upon.

6.3.4 There is also evidence that many people would prefer to become involved in a campaign as individuals as opposed to being part of a community event. Therefore it is important that any awareness raising and incentive campaign uses a variety of means to involve people. Part of any scheme needs to make people aware of the energy consequences of the distance travelled by goods and of the benefits of purchasing locally produced goods and food. There are a number of organisations in Manchester who are taking a lead with regards to conserving energy. In order to engage smaller businesses, communities and individual residents, the top organisations in Manchester need to show their commitments to energy conservation. This commitment will also need to be shown in terms of procurement.

6.4 Transport Sector

6.4.1 The transport sector presents us with one of the biggest challenges in terms of reducing unsustainable energy use. The only truly renewable source of transport fuel is biodiesal but there are practical hurdles in terms of distribution and use of this energy source.

6.4.2 Travel plans are seen as one of the major ways of reaching people and raising awareness of the need to reduce the reliance on private cars. The growth in working from home and the sighting work opportunities and homes in close proximity provides an opportunity to halt traffic growth. One of the most significant means of reducing the reliance on private cars is to provide good quality public transport, the expansion of Metrolink has to be one of the most significant steps to reducing carbon dioxide emissions from the transport sector.

6.5 Renewables

6.5.1 There appears to be a lot of contradictory information about the economic viability of renewable energy sources. Certainly capital investment is required to harness renewable resources and if investment decisions are based on a more longterm approach then renewables would be viewed more favourably by investors.

6.5.2 Renewables have the ability to achieve an iconic status and can be used as a visible means of showing the city's commitment to reducing carbon dioxide emissions. Opportunities exist within the Housing Market Renewal programme, Building Schools for the Future and key development sites to promote renewables. It is considered practically feasible that 10% of the energy requirements of a new building come from renewable sources, however, it can be argued that such technology adds to the cost of a home. Unit price of accommodation in Manchester is a key element in regenerating failed housing markets. Consequently, a fundamental decision has to be made about the value given to the environment over other pressing demands. Another argument is that the cost of renewables is over exaggerated and that if renewables are taken into account at an early enough stage in the design process then added costs should only be marginal. This important issue needs to be clarified and practical steps to implementation achieved.

7. Strategic Vision, Action Plan and Implementation

7.1 Vision

Taking into account the conclusions from the baseline study the vision for Manchester's energy strategy is as follows:-

Manchester recognises that it needs to reduce its unsustainable use of energy in order to promote environmental, economic and social well being both in Manchester and across the globe. Manchester will take action to reduce its carbon dioxide emissions by an average exceeding 1% per annum. This will be achieved through action to support 3 strategic objectives:-

- *raising awareness about the need to conserve energy within all sectors*
- *improving energy efficiency and increasing the use of renewable energy sources in new developments in Manchester*
- *improving energy efficiency and increasing the use of renewable energy through procurement*

In order to achieve this high level vision Manchester will:-

- determine local targets to which all partners participating in the strategy have agreed
- determine an action plan to which all partners participating in the strategy have agreed
- set up a board to oversee the implementation of the action plan and to review the strategy annually.

7.2 Local Targets

In 2 years

- To have 2,000 businesses signed up to the business pledge
- Have worked with over 1,000 households and 200 small businesses to conserve energy
- Have standards above the Building Regulation Standards in new developments in the housing market renewal areas and introduce renewable energy into developments
- Have 85% of schools registered as Eco schools
- To have over 5,000 unique visitors to the energy website

In 5 years:-

- To have reduced carbon dioxide emissions in the top 30 companies by 15% in comparison against 2002 baseline
- To have reduced carbon dioxide produced in the domestic sector by 23% against a 1995 baseline
- To increase the proportion of person trips to the city centre crossing a cordon inside the Inner Relief Route between 7.30 and 9.30 am by means other than the private car to 62% by 2008.

7.3 Action Plan

An action plan (see table 1) has been developed which identifies actions in support of the 3 strategic objectives. The plan details the lead agency, partners involved in the action, funding available or required, milestones and expected outcomes.

7.4 Implementation of the Action Plan

The implementation of the action plan should be overseen by a partnership board which could include:-

- University of Manchester
- Chamber of Commerce
- Manchester City Council
- Renewables Northwest
- Community Network
- GMWDA
- Environment Agency
- Knowledge Capital

As well as representatives from the banking sector, energy suppliers/generators and development sector. This Board would meet quarterly and report twice a year to the Sustainable Neighbourhoods Partnership.

Table 1

Manchester's Energy Action Plan

	Action	Lead agency	Partners	Funding	Milestones	Expected Outcome
	Strategic Objective: *raising awareness about the need to conserve energy within all sectors*					
1.1	Energy Conservation Areas	MCC	Voluntary sector, Business Link, Utility companies EEAC	Housing Investment Programme resources for 2005/06 Match funding from the fuel utilities Dedicated officer from Housing	Start August 2005 with pilot area, review pilot in Feb. 2006	Measurable reduction in energy use in area
1.2	Website	MCC	University voluntary sector	NRF	Launch website January 2006	Increased awareness of the need to save energy
1.3	Energy awareness in schools	MCC	Merci EEAC Energy Team	SIF EST	75 schools to bronze, 10 to silver, 2 to gold by 2006	Reduced use in energy in schools.
1.4	Increase	MCC	Groundwork,	NRF and EA	2,000	Reduction in

	participants in the Manchester Business Pledge		Environment Agency, Business Link	funding	businesses signed by 2007 and increased number of businesses accredited to the UK energy accrediation scheme	energy used by businesses signed up to one pledge
1.5	“What’s SAP all about” campaign	MCC	Estate Agents EEAC	A marketing initiative involving the EEAC and piloted in the Energy Conservation area	Start August 2005	Increased awareness amongst estate agents and home owners of energy conservation
1.6	Big Boiler Campaign	MCC	Large scale commercial businesses and public sector agencies	NRF	Oct 2005	% reduction in energy wasted through inefficient boilers
1.7	Eco House Demonstration Project	MCC	English Partnerships Installers and manufacturers	Capital funding allocated for 2005/06	Eco home opened in July 2005	To demonstrate and encourage the take up of energy saving

			of energy efficiency products BRE Scott Hughes Design	In kind from donation of products		measures, appliances and environmental initiatives eg. recycling and saving water. To provide a special interest centre for local schools and colleges.
1.8	Healthy, Safe and Warm Homes Strategy	MCC	PCT's, Community Groups, Voluntary Organisations, Fuel Utilities, Police, EEAC Joint health unit	HIP resources Utilities funding PCT EST	Launch of the Strategy May 2005	Integration of healthy, safe and warm projects to reduce fuel poverty and create sustainable homes and communities. Reduction in fuel poverty
1.9	Support for Knowledge Capital	MCC	Universities	None required	New initiatives created to promote energy conservation	Reduced energy use and increased use of renewables. Completion of an Eco Footprint

					and renewables	by 2006.
Strategic Objective promoting the need to improve energy efficiency and increase the use of renewable energy sources in developments in the city						
2.1	Determine the standard of energy conservation and percentage of renewables that can be introduced into new developments.	MCC	Developers RSLs	NRF	Feasibility study produced May 2005.	Increased % of new or refurbished buildings in Manchester that are at a standard over and above the Building Research Establishment standards and % of buildings with renewable energy sources.
2.2	Provide assistance to developers in applying for DTI grants	MCC	Carbon Trust	NRF	Immediate	Value of grants awarded and estimate of energy saved
2.3	Planning policies implemented that will reduce travel	MCC	Developers	Mainstream MCC	On going	Evidence of mixed use development

	distance between work and home					
2.4	Investigation into the practical feasibility of EESCO	MCC	MCC, RSL, Utility Companies	None currently identified	NA	Measurable energy savings and low cost energy provided to Manchester communities
2.5	Investigation into the practical feasibility of anaerobic digestion	GMWDA/MCC	University	None currently identified	NA	Reduced level of waste to landfill.
2.6	Four points of the Compass	MCC	NWDA, Utility Companies, DTI	None currently identified		Wind turbines installed and supplying low cost energy to Manchester communities
Strategic Objective: improving energy efficiency and increase the use of renewable energy through procurement						
3.1	Implement a green procurement policy	MCC		Mainstream MCC	September 2005	Energy reduction through green procurement
3.2	Self-sufficient streetscapes	Red Rose Forest	MCC, Agent	NRF	November 2005	Numbers of street furniture

						powered by renewable sources
3.3	Carbon busters	MCC Red Rose Forest	Red Rose Forest, Future Forests, NWDA	Various	1,500 trees planted per year	More carbon dioxide absorbed.
3.4	Implement MCC Green Travel	MCC All major companies in Manchester	Public transport providers	Various	Plan adopted by Sept 2005	Reduction in private car use
3.5	Where's my bus?	Public travel providers	GMPTE	No funding currently identified	Investigate funding Sept 2005	Increased bus use
3.6	Maximise opportunity for supply of energy from renewable sources to power MCC properties and street lighting and to conserve energy in MCC buildings.	MCC		Mainstream MCC	20% reduction in carbon dioxide emissions by 2010	Reduced emissions of carbon dioxide

Project Descriptions

These project descriptions relate to table 1.

1.1 Title: Energy Conservation Areas

An area based energy awareness and advice campaign that provides individual business and community support. The scheme will be piloted in one area of mixed commercial and residential properties to include up to 1,000 households. The main objectives of the Energy Conservation Area will seek to raise awareness across all sectors, provide curriculum related energy education for schools, and to kick start energy awareness throughout the community and to generally develop and implement energy efficiency good practice.

A community referral system will be set up to encourage the take up of grants and schemes for the most vulnerable in the community.

1.2 Title: Website

Dedicated web page for Manchester's energy strategy that has details about actions to improve energy savings and invest in renewables. Would include regular news items and an individual pledge to a low carbon future, as well as a self-assessment tool. The self-assessment tool for individuals would enable them to determine how much carbon dioxide their lifestyle produces. The self-assessment would include some handy hints on reducing energy use and a pledge to sign up to taking action to reduce energy. The pledger would receive a request to update on their progress to reduce energy once every 6 months. To include awareness of food miles.

1.3 Title: Energy awareness in schools

Continuation of the eco schools project in schools and measurement of energy use that will be considered by the school eco panel. To include awareness of food miles.

1.4 Title: Increase participants in the Manchester Business Pledge

The 100 days business pledge has been developed to include wider environmental issues including energy efficiency. The pledge is being promoted to major businesses in Manchester so that they can be shown to be leading other businesses to sign up. Work is also progressing on an area basis in Rusholme to encourage take up of the pledge. To include awareness of food miles. There is also, depending on funding, an opportunity to increase the number of small energy efficient innovations such as PID alarm system technology that

switches lights off when a room is not in use and simple plug-in energy saving devices for large scale computer facilities.

1.5 Title: "What's SAP all about" campaign

A campaign targeted at estate agents, getting them to agree to promoting the SAP rating of a property and explaining this to purchasers. This will be piloted initially in the Energy Conservation Area.

1.6 Title: Big Boiler Campaign

The concept behind the "Big Boiler Challenge" would be to improve energy efficiency and reduce air pollution from commercial boilers. Businesses would need to sign up to a pledge which would include a commitment to service any boilers and to make improvements to improve energy efficiency and reduce air pollution. A package of assistance for businesses would be to include training for businesses. A Breath Easy Boiler Award would be given to the most improved boiler.

1.7 Title: Eco House Demonstration Project

The Eco House will provide a comparative setting in which to introduce the concept of energy efficiency in a practical 'hands on' environment, where individuals can assimilate the benefits of such devices in the home. It will demonstrate insulation measures, efficient heating systems, low energy appliances, renewable energy systems, garden composting, recycling and water saving devices and suggest various options for consideration. It will demonstrate standard products that are readily available, 'low cost no cost' ideas and the more unusual products that are a vision for the future. It will provide ideas that are suitable for refurbishment, retro fitting and for new build. The project will be linked into the national curriculum and provide a special interest centre for local schools and colleges.

1.8 Title: Healthy, Safe and Warm Homes Strategy

Publication of a strategy to tackle fuel poverty.

1.9 Title: Support for Knowledge Capital

Ensuring that actions in support of the energy strategy seek to maximise benefits to the Knowledge Capital.

2.1 Title: Determining the Standard of Energy Conservation and Percentage of Renewables that can be Introduced into New Developments.

There is a range of data which shows that improvements in energy conservation and provisions of renewables can add to the costs of developments; this data needs to be assessed and a decision made as to the feasibility of enhanced measures for Manchester.

2.2 Title: Provide assistance to developers in applying for DTI grants

Currently we do not help developers search for grants, this could be one way of giving an incentive to encourage high energy efficiency designs and renewables.

2.3 Title: Planning policies implemented that will reduce travel distance between work and home

Monitor implementation of mix use developments

2.4 Title: Investigation into the practical feasibility of an Energy Environmental Services Company

There is evidence that localised supply networks work, and provide significant environmental, social and economic benefits as per the scheme in Wokingham. It is proposed that we undertake a feasibility project to determine whether such a scheme would be beneficial in Manchester. This feasibility study would include a determination of the benefits of such a scheme particularly with regards to tackling fuel poverty, an assessment of possible developments sites and an investigation into funding options. This project is subject to funding being secured.

2.5 Investigation into the practical feasibility of anaerobic digestion

This proposal could be undertaken as part of the development of new means of tackling waste as proposed within the Greater Manchester Municipal Waste Strategy. This project is subject to funding being secured.

2.6 Title: Four points of the Compass

Wind power is economically feasible; however wind turbines have not been sited in urban areas due to safety and noise concerns. Safety and noise concerns can be resolved through careful design and sighting. Urban turbines will need to be large enough to make a visual impact, and to provide renewable energy for a small community of say up to 200 homes. However the turbines main role will be to raise awareness and to show Manchester as a World Class Sustainable City. It is proposed that four wind turbines are constructed – North, South, East and West. The wind turbines project would be undertaken with local communities and the community would decide how the power is used. The involvement of the University of Manchester would promote

them as an international centre of excellence in community renewable energy schemes. This project is subject to funding being secured.

3.1 Title:Implement a MCC green procurement policy

MCC is currently developing a detailed Green procurement policy which will build on the actions already taken to protect and improve the environment. This Policy will enable MCC to ensure maximum environmental benefit is gained through the Procurement process whilst maintaining the principle of delivering best value for money .
MCC will fully utilise it's substantial buying power to achieve the following objectives :

- Effective protection of the environment
- Prudent use of natural resources
- Social progress which recognises the needs of everyone
- Maintenance of high and stable levels of economic growth and employment.

Achieving this aim, and recognises its international obligations as agreed at the Kyoto Conference and by the European Commission

3.2 Title: Self-sufficient streetscapes

A programme of converting energy consuming street furniture and equipment to more energy efficient systems and renewable energy technological options. This is being planned by Red Rose Forest in the city centre.

3.3 Title: Carbon Busters

Trees act as carbon dioxide mops; tree planting programmes can therefore be shown to have a positive impact on reducing the impact of excess carbon dioxide emissions. This programme will also include the monitoring of activities to protect trees and this activity will follow the principles of the biodiversity strategy which is to enhance, and protect habitats.

3.4 Title:Implement MCC Green Travel

This plan will be implemented in 2005 and will be used as a means of publicising the Council's practical commitment to Greening Manchester.

3.5 Title – Where's My Bus?

A system that allows everyone to know when the next bus/tram/train will arrive relative to their nearest stop or station by simply turning on their mobile phone. This project is subject to funding being secured.

3.6 Title – Green Energy Supply for MCC

Currently all of the electricity used in MCC buildings and street lights comes from renewable resources. However, this is also financially viable for the Council, as the demand for green energy increases the cost may rise hence a realistic 5-year target has been set.

APPENDIX 1

Renewable Energy Sources

1. Photovoltaics (PV)

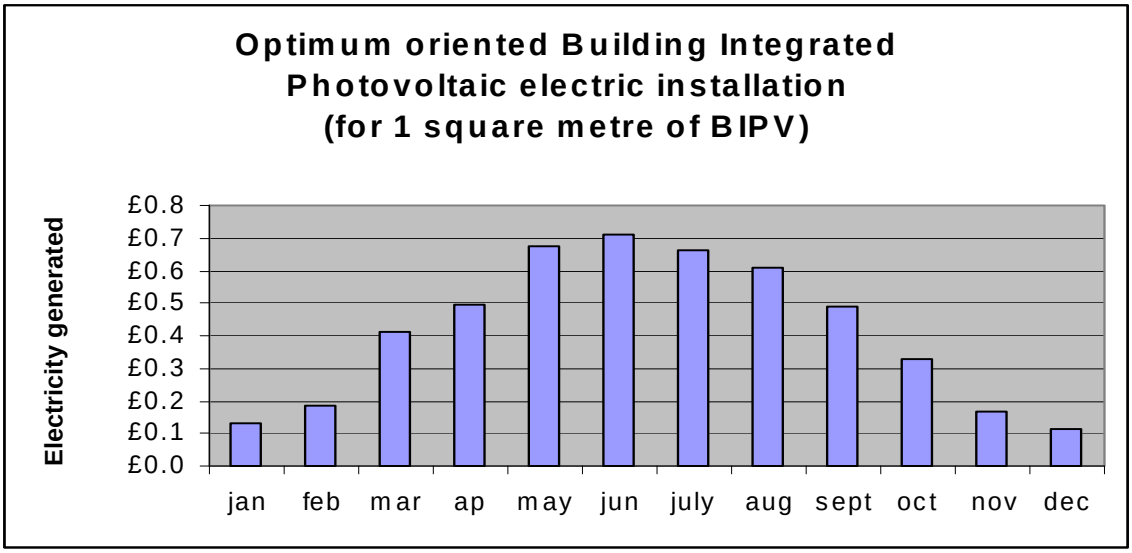
1.1 Solar PV is a technology designed to make use of the photovoltaic effect, when sunlight causes a potential difference across a semi-conductor, to generate current. The present costs of PV technology are high, in the region of 10-15p/kWh compared to 2-3p/kWh for wind energy and 2p/kWh for a modern efficient electricity power station. Expressed in terms of the costs of reducing emissions of one tonne of carbon dioxide, estimates range from £600 to £870 compared to values of £10 to £35 for onshore wind, £45 to £130 for offshore wind and £40 to £50 for energy crops. As shown in figure 1, there is a wide seasonal variation in the amount of electricity generated by a PV system. The payback for a typical PV system, with a Department of Trade and Industry grant is 23 years, without the grant 90 years.

1.2 Whilst the cost of a PV system is currently high, technological and manufacturing improvements mean that these costs are falling, and the nature of a PV system means that there is great potential for integration into the urban environment, both for reducing the energy demand of buildings, or as larger networks that operate as a 'mini grid'. The majority of PV systems to date have been as 'bolt-on' systems, though development of new solar technologies has given rise to a greater variety of products with the potential for integration into the fabric of buildings. These include:

- Roof tiles
- Standing Seam Roofing
- Cladding and façade Systems.
- Sun awnings

1.3 The UK Government is currently funding the 3,000 roof 'Major Demonstration Project' with grants available for the public, commercial and domestic sectors. The new façade for the CIS building in Manchester is partly funded through this programme. The PV system will be installed on the South, East and West aspects of the building and is intended to be the largest in the UK with an installed capacity of 270kWp.

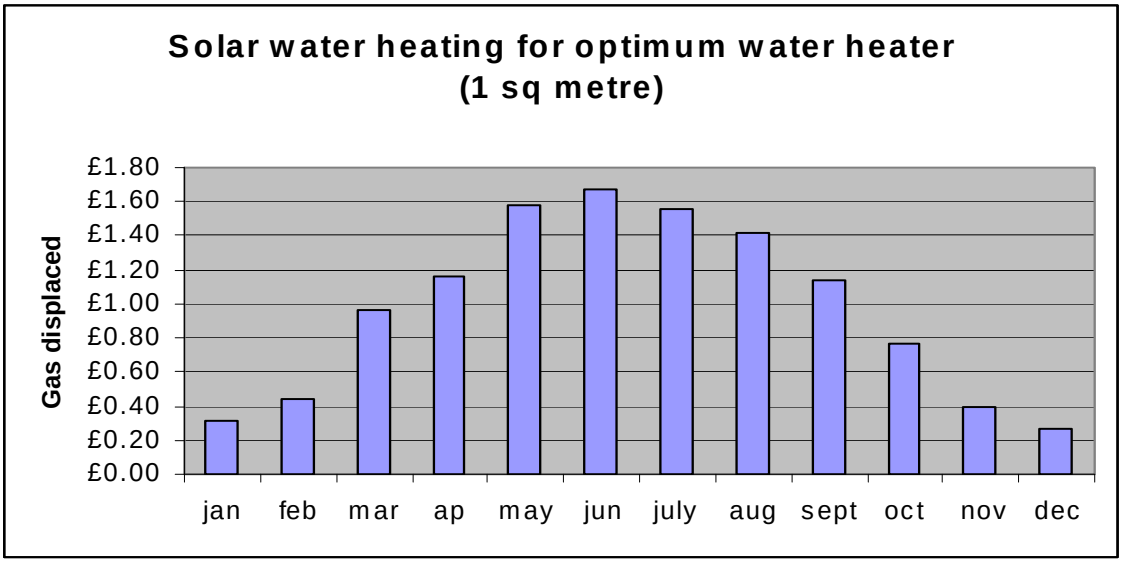
Figure 1 Seasonal variation in electricity from photovoltaics



2. Solar heating panels

2.1 Solar heating uses sunshine to heat water through panels (like encased radiators) positioned on roofs. The water is for washing and showering rather than heating as again the greatest heating is in the summer as Figure 2 shows. The costs are much less than for PV with a typical payback time of 10 to 20 years.

Figure 2 Seasonal variation in output from 1m^2 of solar heating panel



3. Passive solar

3.1 Through the orientation of buildings, and design of buildings' windows, it is possible to utilise the sunshine for heating in winter with appropriate shading to avoid overheating in summer and the need for air conditioning. This needs to be considered in the design of the building or extensive refurbishment of existing buildings.

3.2 Similarly, during building design or refurbishment, daylight can be maximised to save on electric lighting, though it is important to ensure that windows do not allow too much heat to escape in winter or enter in summer. Providing automatic lighting controls that switch off lights when there is sufficient daylight can also save electricity. Such controls have paybacks as low as 3 to 4 years.

4. Wind-Generated Electricity

4.1 In an urban setting the proximity of people and property, raises great technical challenges for the siting of wind turbines. Current planning regulations governing distance of wind energy schemes to property, and infrastructure such as roads etc. limit the potential locations for large stand alone mechanisms within the boundaries of the City of Manchester. That said, more innovative forms of wind energy integration such as the 'bolting-on' of wind turbines to existing and new buildings or full integration, such that the turbines drive the architectural form of a new building may offer more opportunities.

4.2 In Manchester, the roofs of office and high-rise domestic buildings would offer suitable locations for purpose designed small wind turbines. Machines, with a power output of several kilowatts, have the potential to generate 5000-9000 kW annually, and thus make a contribution to meeting on-site demand, rather than providing power for the grid. Conventional tower mounted designs of turbines cost between £3000 and £7000. Some of the power for the communal areas of the 'Green Building' within Taylor Woodrow's Mackintosh Village development in central Manchester will come from a roof mounted wind turbine. More innovative designs are currently being developed; these are likely to be more suited to urban locations having either a lower visual impact or a striking design form.

5. Biomass

5.1 Biomass is the term used for non-fossil organic materials and includes all water- and land-based vegetation and trees and all waste biomass such as municipal solid waste (MSW), municipal biosolids (sewage) and animal wastes (manures), forestry and agricultural residues, and certain types of industrial wastes (i.e. organic wastes from the paper or food industries). Unlike fossil fuels, biomass is renewable as only a short period of time is needed to replace what is used as an energy resource. Biomass is considered a 'carbon neutral' fuel source as the growth of biomass captures CO2 from the air, which is released at the same time as the energy. Biomass is used to generate power through combustion, gasification, and liquefaction, and the microbial conversion of biomass to obtain gaseous and liquid fuels by fermentative methods.

5.2 Bioenergy is used in most Northern European Countries to a far greater extent than in the UK. The major opportunities are for combustion of wood in boilers to produce heat (and possibly also electricity) and biodiesel and bioethanol for transportation. Bioenergy is effectively carbon neutral provided that new biomass is cultivated to replace the stock which has been utilised for energy. Biodiesel is becoming available through national networks as a result of the EU Biofuels Directive and tax concessions on biofuels, and can be sourced from suitable crops in major agricultural areas. Companies such as Greenergy are working nationally with BP to include 5% biodiesel within 'normal' diesel. Utilisation of cooking oils and fats from the food processing is another possible route for production of biodiesel. Within Manchester, the Manchester Environmental Resource Centre Initiative (MERCi) collects waste cooking oil and produces biodiesel for use by members of its distribution co-operative. Hospitality & Trading Services (from within the Council) purchase vegetable oil from Vegetable Oil Management that in turn collects the used oil that is reprocessed and used as biodiesel. Food and organic wastes in general can also be used to produce bioethanol through fermentation, but this is a less developed transport fuel in Europe (though it is well established in Brazil and the USA).

5.3 Modern biomass-fired boilers, using wood chips or pellets are highly efficient (80 to 90% efficiency), clean, reliable, utilize local woodland and are economic when moderate capital grants are available Worcestershire County Council has installed a biofuel boiler for a moderately-sized municipal building in Worcester (containing 200 hundred employees) which generates approximately 1 to 1.3 million kWh per year, using 500 to 600 tonnes of fuel and displacing 250 tonnes of carbon dioxide a

year. The fuel is mostly sourced from woodlands 6 miles away, providing an income for Worcestershire Wildlife Trust.

5.4 The situation in Manchester is quite different from that of a more rurally situated local authority due to the lower availability nearby of woodland fuel. Red Rose Forest has undertaken a study of woodland resource in the six local authorities that it covers (Manchester, Salford, Trafford, Wigan, Bolton and Bury) and has located approximately 11,000 tonnes of wood resource per year, the largest single resource being Botany Bay plantation in Salford. This could be used for small-scale biomass generation. More wood might be available from further afield, but the transport implications would need to be carefully considered.

6. Ground Source Heat Pumps

6.1 A ground source heat pump (GSHP) makes use of the earth's thermal mass, in other words its ability to store heat from the sun, in order to provide space heating or hot water pre-heating. There are three components of a GSHP system:

- The ground loop is a long plastic pipe buried in the ground. A mixture of water and antifreeze is pumped round the systems, absorbing heat from the ground. A ground loop consist of one of three options; a borehole, a straight horizontal pipe and a spiral horizontal pipe or slinky. A horizontal pipe is cheaper than a borehole though requires a larger land area. A 10m slinky trench will provide 1kW of heat load.

- The heat pump works by using the evaporation and condensation of a refrigerant to take the heat from one place and move it to another. In the case of a GSHP, the evaporator takes heat from the water in the ground loop, and the condenser gives up heat to a hot water tank that feeds the distribution system. A compressor moves the refrigerant around the heat pump, and also compresses this in order to increase the temperature at which it condenses closer to that required by the distribution system.

- The distribution system consists of underfloor heating or radiators where the system provides space heating, and water storage where it is used for hot water pre-heating. Some systems can also be used for cooling in the summer.

6.2 Costs for a typical domestic 8kW space heating system are in the region of £6400- £9600 plus the costs of the distribution system. The potential for the installation of a GSHP system are dependent on the amount and type of land available for the ground loop, the type of distribution system, the energy

efficiency of the building (a GSHP works bests where insulation levels are high hence space heating demand is low) and where installation of such a system can be combined with other works.

7. Energy from Waste

7.1 A range of organic waste materials can be used as the feedstock for anaerobic digestion processes. The waste is fermented in the absence of oxygen to produce biogas (methane), bio-solids and a liquid digestate. The biogas can then be used as a fuel by local CCHP stations.

7.2 The organic waste is pasteurised by the process and can then be returned to farmers for use as a valuable substitute for inorganic fertilisers. Anaerobic digestion should therefore be seen as a sustainable waste management system as well as a source of renewable energy. In the UK the focus has been on the treatment of three waste systems.

- Sewage sludge
- Municipal organic waste
- Farm and food processing waste

The first centralised anaerobic digestion process facility in the UK is at Holsworthy in Devon.

8. Combined Heat Power (CHP) and Cooling (CHPC)

8.1 Combined heat and power (CHP) systems are a very efficient technology for generating electricity and heat together. In a conventional power station, the heat generated through combustion a turbine that generates electricity is wasted. In a CHP system, this waste heat is recovered using equipment such as heat exchangers and can then be distributed for space heating or for use in industrial processes. Such a system can therefore be linked into a district heating scheme including offices, shops, universities and factories. CHP reduces CO_2 emissions in the generation of electricity and heat and hence provides efficient economic heating which can be used to alleviate fuel poverty.

8.2 CHP combined with cooling (CHPC) is a potential further application for Manchester City and its stakeholders. In buildings with a demand for cooling through air conditioning, the heat from a CHP unit can be used to drive cooling system known as ‘adsorption’ cooling. In a conventional cooling system, heat is

extracted from refrigerant through compression and the cooled refrigerant is then re-circulated through the system. In adsorption cooling, the refrigerant is absorbed into a carrier liquid and separated from this for recirculation using heat from the CHP unit.

8.3 Whilst CHP schemes are highly efficient means of fulfilling energy requirements, with a typical efficiency of 80% compared to 30% for generation in a conventional gas fired turbine they face some constraints. Current regulations governing the sale of electricity means that selling surplus electricity to the electricity distribution companies is not profitable at present. Electricity would have to be used internally by the partners in order to be viable.

8.4 Similarly, the economics of a CHP schemes are highly dependent on electricity prices and the number of days a year that they operate. For example, a small scale CHP with low annual usage and a low electricity price has a payback time of 46 years. With a longer annual usage and higher electricity price the payback is 3.5 years. At present electricity prices for large users are low, reducing incentives to develop CHP.

8.5 Leisure centres (sports halls) represent a good sector of the CHP market because of their energy intensity. In the UK, there are currently 327 CHP installations in the leisure sector.

8.6 In the public sector, hospitals and schools are often quoted as suitable buildings for CHP use. Hospitals have a high heat to power ratio and an all-year heat demand, making them ideal sites for CHP. As such, many sites already have CHP installed. In the UK there are currently over 200 CHP installations in the health sector. In terms of schools, it is apparent that the intermittent use of such premises throughout the year is likely to be unsuitable for CHP use. However, this may not be the case for some establishments that have boarding school or leisure facilities. This assertion is confirmed by the fact that there are 28 CHP installations in the education sector. In contrast, educational establishments such as universities and colleges may represent ideal candidates for CHP use. In UK universities, there are currently 17 CHP installations with an average size of 1.2MWe.

8.7 Hotels have been one of the favourite targets for CHP installers, though there are not many systems in operation. For example, in the UK there are a total of 260 CHP units in operation in hotels. The units are generally in continuous use (8760 hours per annum) and have a high demand for hot water throughout the year. At night, the demand for heat is generally lower, therefore, the heat output of the CHP could be used to supply heat to

stored hot water. Large hotels also often have a swimming pool with 24-hour heat demand or an on-site laundry that could use any excess heat.

8.8 The suitability of offices for different CHP technologies primarily depends on the operating hours of the business and to a lesser extent the need for air-conditioning systems. Many CHP technologies are not designed to be turned on and off regularly, which makes them unsuitable in a conventional office that typically only requires heating or cooling approximately 2500-3000 hours per annum. A new breed of modern offices has emerged in recent years, however, that require constant heating and cooling load to protect computing and communication equipment. In addition the growth of offices that operate on a 24-hour basis could represent a realistic market for CHP technologies.

8.9 The retail sector covers a very wide range of sizes and types of premises. In many respects, shops are similar to offices in terms of energy use. Unlike most offices, however, shops tend to be open six or seven days a week for relatively long hours. In addition, the food-retailing sector has seen a rise in the number of superstores that are open up to 24 hours a day. Therefore, operating hours in the retail sector are likely to range from between 4000 to 8000 hours per annum, which makes them a good candidate for CHP use, especially with absorption cooling.

Refrigeration in supermarkets and warehouses provides a continuous cooling demand that can be met by an absorption refrigeration system. In the UK, a typical supermarket has a total electrical demand of 400kW of which 50 per cent is used to power refrigeration equipment (providing approximately 400kW of cooling). Although warehouses are generally not considered as the most suitable application for CHP technologies, a significant number would be expected to have cooling requirements for food refrigeration. Cold stores (refrigerated and frozen) represent a particularly good example because they have a continuous refrigeration demand and electrical demand for lighting, fans, pumps and possibly battery-driven forklift trucks. Approximately 80 per cent of the total energy use in such stores is for cooling. Therefore they would be ideally suited to CHP with absorption cooling.

8.11 Although it is generally believed that the service sectors are likely to represent the main target markets for CHP applications, it is evident that certain activities in the manufacturing sector will be suitable for CHP use. These types of business are likely to have long operating hours, often well in excess of 4000 hours per annum.

8.12 Recently micro CHP has been trailed in homes in the UK. These units are self-contained CHP units, which provide the electricity and space/water heating for an individual home (at peak times electricity has to be imported from the national grid). These overcome some of the difficulties of district CHP units in that there is no need to create additional infrastructure also the consumer can switch energy supplier but this has no negative effect on the CHP generation as it is integral to the home. There are cost implications to this technology however it presents a future opportunity to overcome the difficulties of CHP.

Appendix 2

Tackling Fuel Poverty in Manchester

Definition of Fuel Poverty

In the Government's Fuel Poverty Strategy 2001, the DETR defined a fuel poor household as one "which needs to spend more than 10% of its household income to achieve a satisfactory heating regime (21 degrees C in the living room and 18 degrees C on other occupied rooms)"

In Manchester, approximately 11,000 people live in fuel poverty.

Causes of Fuel Poverty

There is no single cause of fuel poverty; it arises from a combination of 3 main factors. These are, low household income, poor heating and thermal insulation standards in the property and high fuel costs. Under occupation, especially amongst the elderly population, is another contributory factor. Whatever combination of factors are present, the result is cold, damp unhealthy homes where the resident cannot afford to adequately heat their home.

The Impact of Fuel Poverty on Health

The link between energy inefficient housing and ill health is well documented. Cold, damp homes, which are inadequately heated and insulated, have repeatedly been linked to ill health and early deaths amongst the most vulnerable people in society. Nationally there are known to be around 30,000 excess winter deaths per annum through cold related illnesses; approximately 180 of these are in Manchester.

The incidence of fuel poverty and excess winter deaths in the city is totally unacceptable and the City Council together with health organisations, voluntary and community groups, is determined to eradicate the problem among the city's residents.

The Government's Commitment to Fuel Poverty

The Government is equally committed to tackling fuel poverty and has introduced a series of policies and legislation to encourage and enable Local Authorities to act.

- The national commitment is underpinned by the first legislation to deal with fuel poverty - The Warm Homes and Energy Conservation Act 2000 and by the publication of the Government's Fuel Poverty Strategy in 2001. Since then Local Authorities have been required to address fuel poverty issues alongside their energy conservation strategies and report

their progress in the annual Home Energy Conservation Act (HECA) Progress Reports.

- The Decent Homes Standard introduced by the ODPM in 2001 incorporates a thermal efficiency standard and requires all social housing in England to provide affordable warmth for tenants by the year 2010.

- One of the 4 principle aims of the Energy White Paper – "Our Future, Creating a Low Carbon Economy" 2003 is the elimination of fuel poverty.

- More recently, the Housing Act 2004 introduced provisions that are designed to encourage action by Local Authorities to raise the standard of housing, especially in the private sector. These include:

    - mandatory licensing of certain Houses in Multiple Occupation and selective licensing for private landlords in designated areas in the private rented sector. Local Authorities can use these methods of intervention to encourage landlords to improve the heating and insulation for their tenants
    - The new Housing Health and Safety Rating System to replace the current Housing Fitness Standard. Cold is likely to be amongst the most prevalent hazards in the housing stock and it will enable local authorities to use enforcement powers as part of their energy and housing renewal strategies.

Background to Fuel Poverty Initiatives in Manchester

Affordable Warmth Strategy 1997

In 1997 Manchester City Council became the first local authority in the UK to publish an Affordable Warmth Strategy. Over 60 local authorities have since followed Manchester's lead role and developed similar strategies.

Since the publication of the 1997 strategy, the provision of affordable warmth for households has become a national priority. The Government is committed to the eradication of fuel poverty for vulnerable households by 2010 and for the remainder of the fuel poor within a further 5 year period.

The City Council's Energy Group within Housing Services has taken the lead in delivering the Affordable Warmth Strategy for Manchester. It has successfully introduced a range of energy efficiency and affordable warmth initiatives across the city for both public and private sector householders.

Achievements to Date Since the 1997 Strategy

- The 1997 Affordable Warmth Strategy became the catalyst for the implementation of the Heating 2000 Initiative. This programme gave priority funding within the Housing Investment Programme to deliver central heating and insulation to all council properties within the City of Manchester by the year 2000. The programme was completed on time.

- The Standard Assessment Procedure (SAP) is the methodology used to show the energy rating of homes. The SAP indicators range from 1 – 120 where the higher ratings indicate that the home needs less energy to heat it. The national average SAP rating is 57. The average SAP rating for Manchester's local authority owned stock has increased from 48 in 1999 to 61 in 2003/04, which is above the national average.

- The average SAP rating for Manchester's private sector housing has shown a slower increase from 48 in 2001 to 50.6 in 2003/04. Raising the SAP rating of private sector homes by effective identification and targeting is therefore one of the key aims of the new strategy.

- Since 2000, the Energy Group has attracted £1.8 million of extra resources to the City Council. This has been achieved by establishing partnerships with fuel utilities and outside organisations and by making successful bids for funding from a variety of grant schemes. The income has been used to improve the energy efficiency of Manchester's homes. The principle of partnership working will continue to be a key method of assisting the City Council to deliver the objectives of the Healthy Safe and Warm Homes Strategy.

- The Home Energy Loan Plan, initially set up from a Government grant, operates in partnership with Manchester Care and Repair Limited. It provides interest free loans to householders to install energy saving measures in their homes.

- The Energy Group successfully bid for the management of the Greater Manchester South Energy Efficiency Advice Centre in October 2001. The EEAC offers free impartial energy advice to the residents of Manchester and 5 other Local Authority areas – Salford, Stockport, Trafford, Tameside and Wigan. After 2 years of operation, the Energy Saving Trust has recognised the outstanding performance of the GMSEEAC by awarding it an 'Excellent' rating, one of only 2 such awards across the national network of 52 EEACs.

The 2005 Healthy, Safe and Warm Homes Strategy

In partnership with a variety of organisations, the City Council will launch its 'Healthy, Safe and Warm Homes Strategy' in 2005. This follows on from the city's pioneering role in tackling the problem of affordable warmth in the late 1990's. The new strategy, which focuses on the integration of healthy, safe and warm initiatives, will maintain this forward thinking approach.

The provision of affordable warmth has gained far greater political recognition and social importance over the past 5 years. The detrimental effects of fuel poverty on health, educational attainment and overall well being, are now acknowledged by key organisations in each of these major policy areas. Manchester has recognised that there is clearly a need for developing a more comprehensive and integrated strategy, one that combines fuel poverty initiatives with a range of services currently provided by the Primary Care Trusts and voluntary and community organisations. Equally there are opportunities for joint working between staff involved in promoting key City Council policies and strategies. These would include: Valuing Older People, Supporting People, Crime and Disorder and Sustainable Neighbourhoods Partnership.

The new Healthy Safe and Warm Homes Strategy will provide an agreed framework for the integration of initiatives and will provide opportunities to target resources at those most in need. By providing a more comprehensive, coordinated approach, the most vulnerable households can be identified and accessed through referral mechanisms and signposting between energy efficiency schemes, home safety initiatives and a range of health services.

Therefore the underlying priority of the strategy will be to develop and coordinate opportunities for joint working across a range of public sector, health service and voluntary sector initiatives in order to create healthy safe and warm homes.

To assist with the above, a Steering Group with representatives from various departments and organisations has been formed to ensure the effective delivery of the strategy. A series of action plans have been developed to facilitate the delivery process so that positive action can be regularly monitored and assessed.

The Objectives of the Strategy

The 10 main objectives of the 'Healthy, Safe and Warm Homes Strategy for Manchester' are grouped under 3 main aims. Each objective has key tasks, targets and timescales with a priority listing and designated lead group to assist with its delivery.

Aim 1 To help to eradicate fuel poverty in the city by:

i) Identifying residents most in need
ii) Assisting residents in need

Aim 2 To reduce energy consumption and greenhouse gas emissions that contribute to global warming by:

iii) promoting awareness of energy efficiency and advising all key workers and sections of the community how to achieve healthy, safe and warm homes

iv) maximising resources to assist with the delivery of the strategy

v) incorporating new technology into initiatives

Aim 3. The integration of initiatives in order to encourage a joined up approach to achieving healthy, safe and warm homes by:

vi) creating accountability and ownership for the strategy

vii) ensuring effective collaboration between organisations

viii) integrating energy, health and security related projects

ix) developing a marketing strategy

x) monitoring and adapting the strategy

The strategy is due to be launched in April 2005

Appendix 3

MANCHESTER
CITY COUNCIL

Buildings Energy Policy

June 2004

CONTENTS

1.0 CORPORATE COMMITTMMENT

The Council fully supports the national and international efforts that are being made to combat the effects of climate change.

The Buildings Energy Policy has been developed to reflect the commitment of Manchester City Council to improving energy and water management and reducing CO_2 emissions within the council's buildings.

The Council is committed to the continuous improvement in its energy efficiency performance, and in the review of energy management plans.

The Energy Management Policy will be reviewed on an annual basis and in conjunction with review procedures for complimentary policies.

Signed _____ **Date**_____

Councillor Neil Swannick
Executive Member Planning and Environment

This section is a mock up of the type of "corporate commitment" statement that <u>may</u> be used to demonstrate high-level support.

2.0 EXECUTIVE SUMMARY

Manchester City Council is committed to improving energy efficiency and reducing the negative environmental impact of energy use in its operational buildings.

The Building's Energy Policy is a key part of the Council's wider objectives for environmental improvement, and builds on previous progress and commitments made by the Local Agenda 21 Strategy, the Local Authority Environmental Stewardship initiative and the Sustainability Best Value Review of 2001.

The aim of the Policy is to:

- Improve the Council's energy efficiency
- Reduce CO_2 emissions in line with national targets
- Encourage the use of cleaner and more efficient energy technologies
- Increase the use of "Green" energy generated from renewable sources
- Ensure energy consumption is considered as part of building use, maintenance, fitting out, refurbishment and replacement
- Minimise the Council's expenditure on energy

The Policy sets out the following short/medium term objectives from the baseline year of 2002/3:

- Reduce energy consumption by 2%, year on year, for the next 5 years
- Reduce CO_2 emissions by 2%, year on year, for the next 5 years
- Achieve additional CO_2 reductions of 5% over the next 5 years by utilising renewable energy resources

These aims and objectives will be achieved by:

- Raising awareness and active involvement in energy saving activities
- Identifying the key roles and responsibilities for achieving a step change in energy efficiency
- Improving the monitoring, targeting and reporting mechanisms for energy use and its environmental and financial cost
- Encouraging building operators, users, designers and all City Council Staff to work pro-actively to eliminate energy wastage
- Making lifecycle energy use a key decision making factor in the procurement of goods and services
- Encouraging innovation through the use of low energy technologies and energy generated from renewable sources

3.0 CONTEXT AND SCOPE

3.1.0 CONTEXT OF POLICY

3.1.1 **National CO_2 Targets**

The UK Government has made commitments to the international community on how it will improve its environmental performance. The process was started at the Rio Earth Summit in 1992, and more recently marked by the **Kyoto Protocol** in 2001, where a target was agreed, to reduce CO_2 emissions to 12.5% below 1990 levels by 2010. The UK government's **Energy White Paper of 2003** goes further and identifies the need for a 60% cut in CO_2 emissions by 2050 in order to achieve a sustainable low carbon economy. It is suggested that this magnitude of CO_2 reduction will only be possible through a "step change" in the level of energy conservation activity and by the rapid expansion of renewable energy sources. The Government has stated that it is relying on local authorities to implement initiatives to help reach the target set.

3.1.2 **Future Developments**

The European Union Directive (2003) "Energy Performance in Buildings" must be enacted into UK statute by January 2006 at the latest. As a consequence buildings will have to be inspected, assessed, and certified for their relative energy performance. In the case of public buildings, there will be a requirement for the certificates to be displayed for public scrutiny.

The next major review of the **UK Building Regulations** is due in 2005, and it is widely anticipated that the energy utilisation requirements will be further strengthened for both new and existing buildings. In addition, consideration for renewable energy generation potential may become mandatory, and the use of air conditioning may be restricted.

3.1.3 **The Council's Buildings**

In delivering services to the people of Manchester, the Council operates from over 800 buildings and other sites, spread across all wards of the City. Given the extent and diversity of the building estate, it is no surprise that the council is a major user of energy and water resources.

3.1.4 **Corporate Objective**

As one of its corporate objectives, the Council has declared an intention to develop and sustain a healthy, safe and attractive local environment that contributes to the City's and its peoples economic and social well-being.

3.1.5 **Energy Use Impact**

The energy consumed in buildings operated by the Council has a significant impact on CO_2 emissions and local air quality. This Building Energy Policy therefore looks at what the Council can do to minimise its

own energy and water consumption, protect the environment, and by so doing, promote the benefits of energy efficiency into the wider community.

BEST VALUE REQUIREMENT

The need for this policy was identified in the Environmental Sustainability Best Value Review in 2001. The subsequent Action Plan developed measurable targets to reduce the Council's energy use and CO_2 emissions, and set targets for the introduction of renewable energy sources. The Policy is also a key element of the overall Environmental Action Plan, which identifies the need to make a corporate commitment to the efficient use of energy resources.

3.2.0 SCOPE OF POLICY

3.2.1 Guidance

It is the intention of this policy to set out the broad principles for energy use and how it should be considered as an integral part of our daily work and decision making processes. Responsibility for energy use, and its waste, is something that everyone in the organisation can influence. The decisions made by elected members, Chief Officers and other senior managers are clearly influential, as is the role of building operators and facilities managers. However, the active contribution of all staff is vital, who through being aware of energy use, and taking simple actions to reduce waste in their own workplace, can make a significant contribution.

3.2.2 Advice Notes & Documents

It is not within the scope of this policy to specify detailed methods and techniques for the conservation of energy. In Section 5.0 however, some general Guiding Principles for energy conservation, emission and cost control are included. For more detailed technical information, the Energy Management Unit is available to provide assistance and support.

4.0 GENERAL STATEMENT OF INTENT

4.1.0 OVERVIEW

4.1.1 Environmental and Financial Cost

Conventional energy derived from burning fossil fuels releases environmentally harmful emissions, including large quantities of CO_2, the "greenhouse" gas primarily responsible for climate change. As well as having severe environmental implications, the rate of fossil fuel exploitation is not sustainable, by 2010 North Sea oil and gas reserves will have been exhausted and the UK will be reliant on imported fuels.

The future financial consequences of energy use for the Council will therefore increase as scarcity of resources and environmental taxation such as the Climate Change Levy combine to force up energy prices. The

conservation of energy is therefore seen as a key area in controlling the future revenue running costs of Council buildings.

4.1.2 **Expenditure**

The Council has approximately 2500 utility accounts serving its buildings, which necessitate approximately 20,000 financial transactions to be made each year with total expenditure in the order of £8.5 million. The potential financial benefits of energy saving are therefore considerable.

4.1.3 **Performance Indicators**

As Government's commitment to the environment develops, so to do the responsibilities for the Council in terms of to quantifying its performance on energy use. From 2002/3, the Council has had to calculate Performance Indicators of energy cost, energy consumption and CO_2 emissions for its operational buildings.

4.1.4 **Water Management**

Although not normally considered to be an energy source, water is a natural resource that needs to be controlled and managed using many of the same technical and financial tools that are applied to energy. In addition, each unit of water consumed has some energy invested in it for pumping, water and sewerage treatment. Failing to use water efficiently therefore results in the waste of the natural water resources, a waste of energy and is a financial burden on the Council. Water management should therefore be considered to be an intrinsic part of the Buildings Energy Policy.

4.2.0 POLICY TARGETS AND MONITORING

4.2.1 **Best Value Targets**

In recognition of the need to reduce energy dependence, the Environmental Sustainability Best Value Review of 2001 set the following continuous improvement targets:

(a) Identification of an accurate baseline for energy use and associated emissions.

(b) Reducing energy consumption by 2% year on year, for the next 5 years.

(c) Reducing CO_2 emissions in line with the reductions in energy use.

(d) Achieving additional reductions in CO_2 emissions by using electricity generated from renewable sources in the Council's buildings. The target set to be a minimum of 2% within 2 years, and 5% within 5 years.

4.2.2 **Reporting Performance**

In order to measure progress against targets and performance indicators, the Energy Management Unit will monitor and update energy and water consumption profiles for all Council buildings. This information will then be collated into departmental performance reports, and should be used by property holding departments to identify and prioritise actions that will contribute to the achievement of corporate targets.

4.2.3 **Energy Procurement**

In order to be able to provide this information, and to ensure the Council's bulk purchasing power is maximised, the Chief Executive's Energy Management Unit should be the focal point for all aspects of energy procurement, contract management and conservation advice for the Council's non-domestic building stock.

5.0 RESPONSIBILITIES

5.1.0 LEADERSHIP

5.1.1 It is the responsibility of elected members, Chief Officers and senior managers to demonstrate commitment to the principle of conserving energy and water resources. Direction and leadership should be given to staff with operational responsibilities impacting on energy and water use, and actions taken to motivate all staff to conserve resources.

5.2.0 DEPARTMENTAL

5.2.1 Individual departments that own or occupy buildings should be aware of the relative energy efficiency of these buildings, and through their asset management planning and revenue and capital expenditure programmes seek to raise the energy performance of the building estate.

5.3.0 CHIEF EXECUTIVE'S ENERGY MANAGEMENT UNIT

5.3.1 It is the responsibility of the Chief Executive's Energy Management Unit to provide advice and information to operational departments in order to support them in saving energy and water resources. The Unit should be used to provide the following services:

a) Energy purchasing and contract management

b) Utility payments and accounting

c) Advise on energy efficient design

d) Monitoring and Targeting of energy and water use

e) Energy efficiency surveys/audits/investigations

f) Providing general energy efficiency advice

g) Operation and development of corporate Building Energy Management Systems (BEMS) network

h) Water consumption investigations and all aspects of water management.

5.4.0 STAFF

5.4.1 All Council staff can contribute to the Council's desire to reduce energy consumption and CO_2 emissions by being more aware of the energy being used in their workplace, and where possible helping to eliminate waste by switching of lights and other equipment etc. when not required.

5.4.2 Staff should be encouraged to offer their ideas for saving energy, either in their own workplace or more generally across the council. This can be done through normal day to day channels of communication, through team meetings or direct to the Energy Management Unit. Success stories resulting from the actioning of such ideas will form a powerful tool to promote further savings in other areas.

5.5.0 FRAMEWORK FOR PERFORMANCE IMPROVEMENT

5.5.1 **Departmental Responsibility**

The Council's energy and CO_2 reduction targets set by the Environmental Sustainability Best Value Review are restated in this policy. They can only be achieved through increasing energy conservation activity, and by ownership of energy consumption by the property holding departments, who bear the financial cost of energy use.

5.5.2 **Departmental Contacts**

Each department should appoint an appropriate contact officer/s, through whom energy performance data and information can be channelled. Each department will be responsible for identifying proposals to reduce their energy consumption in line with corporate targets, and enacting these proposals through their normal processes of facilities management, training, resource procurement, capital investment etc. as appropriate.

5.5.3 **EMU Role**

The role of the Energy Management Unit will be in assisting and advising departments in the development of the energy reduction proposals, and via the departmental contact officers, drawing the proposals together into an integrated corporate Action Plan for Energy Saving.

5.5.4 **Targeting and Directing Investment**

The Council's energy use is widely spread across its estate of buildings. Given this, the most effective use of effort and resources will that which yields the best overall outcome in terms of total energy saving. In practice, this will probably be achieved through weaving the consideration of present and future energy use into the fabric of our normal decision making processes for expenditure on **maintenance, new equipment** and **planned system and building replacements**, as well as in many other **revenue and capital investment appraisals**.

It should be borne in mind, that any energy saving measures undertaken will result in a reduction in future energy spend for the life of the asset or scheme. Reinvestment of these savings in further projects will compound the benefits and help to create the momentum required for continuous improvement in energy utilisation.

The Energy Management Unit will be able to assist departments in identifying and prioritising these schemes, in order to maximise the impact of the investment against targets.

6.0 GUIDING PRINCIPLES

6.1.0 INVESTMENT CONSIDERATIONS

6.1.1 **Considering Energy**

When making decisions on the procurement of goods and services, and in the commissioning and design of buildings and building adaptations, consideration should be given to the whole life cycle energy/water use of the proposed asset. In the case of most plant and equipment this will also be a significant factor in the whole life cycle revenue running cost calculation, advocated for investment appraisal in the Capital Strategy Statement, and the Corporate Asset Management Plan.

6.1.2 **Maintenance & Replacements**

Building operators and property holding departments should plan, and make provision for, the replacement of building services systems, plant and other energy using equipment at the end of its normal life cycle. By planning ahead, the need for emergency replacements should be minimised to events of premature failure. In selecting replacement items, consideration should be given to future efficiency, and to undertaking any associated alterations and improvements that are appropriate.

6.1.3 **The Building Regulations**

All works carried out should comply with the relevant sections of the Building Regulations. The sections of the regulations dealing with energy use and conservation in non-domestic buildings, and in particular Section L2, should be viewed as the minimum required provision. Consideration should be given to exceeding this minimum provision where the whole life

cycle assessment of energy/water use, and revenue running cost projections indicate it is viable to do so.

6.1.4 **Working with service delivery partners**

The procurement of assets, and the delivery of services via Private Finance Initiatives, Public Private Partnerships and other partnership arrangements present a key opportunity to improve energy efficiency. Energy use and conservation should be a key factor in the formulation of proposals and subsequent contract construction. The capital investment element of such schemes often presents a once in a generation opportunity to provide an energy efficient building or service for the future. In addition, the long term contractual nature of such schemes underline the importance of giving due consideration to future energy use and cost at the outset. By so doing, the viability and affordability of such schemes may be enhanced, and a framework should be put in place that clearly identifies future responsibility for energy use and that creates and incentive to introduce innovation and conservation.

6.2.0 DESIGN CONSIDERATIONS

6.2.1 **Fuel**

The choice of fuel should be made with due consideration of energy use, relative environmental performance, and revenue running costs. As a general principle, the preferred fuel for space heating, water heating, large scale cooking and other process loads should be natural gas at the present time. Electricity should only be considered for these applications as a last resort, as each unit of energy consumed will be up to 5 times more expensive to purchase than gas, and will result in up to 3 times greater CO_2 emissions.

6.2.2 **Air Conditioning**

Air conditioning is an intensive user of energy, usually electricity, and is expensive to own, operate and maintain. The use of air conditioning should therefore be restricted to the very few applications where a natural or forced ventilation design solution cannot be achieved. The sizing of air conditioning systems should be minimised through good building and room design. Wherever possible, areas should not be simultaneously serviced by separate heating and cooling/air conditioning services. In the interests of energy saving, where air conditioning is installed, room temperature controls for cooling should be set to 24^{o}C or higher. Where heating and air conditioning services do co-exist, they should be automatically interlinked to prevent simultaneous operation.

6.2.3 **Building Zoning**

All heating, ventilation, air conditioning and other services should be capable of being switched off in unoccupied areas. Consideration should be given early in project development to how the building will ultimately

be used; ideally this consideration should involve the client/occupier. A suitable system of zoning should be devised, that will meet the occupier's needs, and offer future flexibility. The philosophy of the plan should be to allow areas of the building to be serviced economically and without waste during periods of partial occupancy.

6.2.4 Control Systems

All building services and other energy using equipment must be capable of being turned off when not required. In most instances, this will necessitate the provision of a suitable control system, the nature and scale of which will be determined by the complexity of the services to be controlled, and their potential to use energy. Detailed information on the selection of appropriate systems is contained in Energy Management Advice Note 1 - Automatic Control Systems.

6.2.5 Lighting

For most Council buildings, lighting represents the single largest user of electricity. The design of buildings, internal design, and lighting systems design should therefore maximise the availability of natural daylight as a means of internal illumination. When selecting artificial light sources, consideration should be made not just to visual amenity, but also to the relative efficacy and energy consumption of the source, the switching regime, and the potential to utilise automatic controls to switch off unnecessary lighting by sensing daylight levels and occupancy.

6.3.0 OPERATIONAL CONSIDERATIONS

6.3.1 Maintenance

Buildings, building services, plant and equipment will only operate efficiently if properly maintained and serviced. The future methodology, ease and cost of maintenance should be given proper consideration at the design and/or procurement stage. If existing maintenance arrangements are not deemed sufficient or appropriate in a particular instance, the future cost of providing the additional/specialised maintenance should be clearly identified to those responsible for future revenue costs, prior to taking the procurement decision.

6.3.2 Multiple Occupiers

Wherever a building or site has multiple occupiers, efforts should be made to accurately identify the energy and water use of each occupier and hence establish ownership for use and its conservation. Advice on metering, sub-metering and cost and consumption apportionment will be available from the Energy Management Unit.

6.3.3 Information Technology

The use of Information Technology has the potential to make a significant impact on energy use in Council buildings. In its broadest sense, the

move toward electronic working may influence the number, size and nature of the buildings we require. In a more direct way, the technology itself can assist in the management and control of energy, through the use of the corporate Building Energy Management Systems network, which is used to provide remote control and monitoring of heating, air conditioning, hot water services, ventilation, motors and lighting in over 150 of the Council's buildings. Whenever new buildings, refurbishments or services upgrades are being undertaken, consultation with the Energy Management Unit should be carried out to seek guidance on connecting to the system.

6.3.4 **Equipment Selection**

The proliferation of IT equipment can also have the effect of increasing energy consumption. Equipment should be selected with relative energy consumption in mind. Where energy saving features such as "rest modes" exist, they should be activated. When purchasing and locating IT equipment it should be borne in mind that each item of equipment presents a source of local heat gain. If significant amounts of IT equipment and users are to be gathered into a single area, consideration must be given to the internal environmental conditions that will be created. If air conditioning is to be used to control room conditions, energy use and CO_2 emissions will increase. In some instances, either local electricity distribution systems, or even main building electricity supplies may be insufficient to support this additional load. If the latter proves to be the case, it should be identified and reported at the early stages of the design or procurement process as the cost to the project of reinforcing the supply authority's infrastructure may be considerable, and the lead in time for such works may extend to several months.

7.0 MONITORING, REPORTING, AND REVIEW

The Building Energy Policy requires regular monitoring, reporting and review to access progress against objectives and targets, to provide information to departmental co-ordinators, building users and other staff, and to ensure that the policy remains focused on strategic goals within the context of operational needs.

MONITORING

7.1.1 **Data Collection**

The Energy Management Unit will record and analyse all energy and water consumption data in Council owned/occupied buildings. It will be the responsibility of the building occupiers and/or property holding department to ensure that this data is made available in a complete, regular and timely manner.

7.1.2 **Benchmarking**

Energy and water consumption will be benchmarked against previous usage, against groupings of comparable buildings and against local and national Performance Indicators for energy and water use.

7.1.3 **Best Practice**

The Council is committed to achieving its energy and CO_2 emissions reduction targets. Information on building/departmental/corporate performance will be used to identify areas of best practice, and areas where opportunities for saving exist.

7.2.0 REPORTING

7.2.1 **Reports to Departments**

The Energy Management Unit will provide departmental co-ordinators and building operators with regular reports on energy and water use, including progress against targets.

7.2.2 **Action Plans**

Departments will be responsible for drawing up a 3 year rolling Action Plan of activities and investments that will have an impact on reducing energy/water use and CO_2 emissions. The departmental Action Plans are to be submitted to the Energy Management Unit for inclusion in the Corporate Action Plan. All Action Plans are to be reviewed and updated on a 6 monthly cycle.

7.2.3 **Annual Report**

Progress against policy objectives and targets, including Action Plans, will be the subject of an annual report prepared by the Energy Management Unit, and presented to the Physical Environment Overview and Scrutiny Committee.

7.3.0 REVIEW

7.3.1 **Policy Review**

The Energy Management Unit will be responsible for facilitating regular reviews of the policy in order to ensure continued alignment with corporate strategy and operational needs. Policy Review and Performance meetings, including departmental co-ordinators, will be used as the forum to feedback information and reaction on the policy objectives, content, application etc.. Any recommended actions or policy amendments that stem from this review process will form part of the annual report to the Physical Environment Overview and Scrutiny Committee.