

West Midlands Regional Energy Strategy

November 2004

Developed by a Partnership Steering Group and Working Groups, with
Support from:

West Midlands Regional Assembly

Advantage West Midlands

Government Office for the West Midlands

FOREWORD

I am pleased to present the West Midlands Regional Energy Strategy. Its main aim is to make the West Midlands the most energy efficient region in the UK.

The Government's Energy White Paper identifies many challenges for UK energy policy: the threat from climate change, the decline of indigenous energy reserves and the need to ensure affordable warmth for all. We also need to ensure that the UK's energy infrastructure is able to meet the demands that will be made of it over the next two decades. The Government wants to work in partnership with the regions to realise its national objectives through local and regional policies and actions. It recognises that regional powers, spending and influence have the potential to achieve the reductions in energy-related emissions that are required to tackle climate change. Our Strategy will therefore make an important contribution to the meeting the goals of national energy policy.

The West Midlands will benefit in several ways as a result of implementing this Strategy successfully: savings on fuel bills, adequate and affordable home heating, improved air quality and more secure energy supplies. Businesses in the region will benefit from the commercial opportunities that will flow from developments in technology and improvements in energy efficiency. If we fail to act, not only will we miss out on these benefits, we will also fail to make our contribution to urgent national and international efforts to tackle climate change.

The Regional Assembly will lead in the uptake of the Strategy along with our partners Advantage West Midlands and Government Office West Midlands. This Strategy will be the starting point for a range of actions. So we will need to maximise support from as many partners as possible to see these through. As you read it I therefore urge you to consider how you and your organisation can help achieve its goals. The Strategy names a number of organisations that could take a leading role in delivering its objectives, and I encourage as many of these organisations as possible to work with the Regional Assembly and partners to identify ways in which they are able to contribute towards the implementation of the strategy.

The Regional assembly is grateful to the many partners who have contributed to the Strategy, and especially to Nick Baldwin for chairing the Strategy Steering Group. We also wish to thank our project consultants Ecotec.

Copies of the Strategy are available on request or on the Regional Assembly web site at www.wmra.gov.uk



Bransby Thomas

Chair,

West Midlands Regional Assembly.

November 2004.

Executive Summary

Why we need a strategy

Climate change is perhaps the most significant threat facing the world today and energy use is the main source of the greenhouse gases that cause it. Climate change is already having impacts across the world, and in the West Midlands too. These will become more extreme in future, particularly if no action is taken now to reduce greenhouse gas emissions.

Our vision for this Energy Strategy is that:

By 2020 we will have delivered the West Midlands' commitment to the climate change challenge, having ensured a sustainable, secure and affordable supply of energy for everyone and strengthened the region's economic capability.

A positive response from the West Midlands will bring benefits including:

- More profitable businesses through improved energy efficiency in industry and commerce.
- Fewer homes that are not heated adequately or affordably.
- Better air quality.
- A dynamic business sector based on new energy technologies and services.

The Strategy will contribute to the goals of the national Energy White Paper¹, which made clear that Local Authorities, Regional Development Agencies, Regional Assemblies and Government Offices in the Regions have an important role to play in the successful delivery of national energy policy.

Objectives

The Strategy has four headline objectives:

Improving Energy Efficiency

Using less energy will reduce emissions of greenhouse gases. Crucially, this need not be at the expense of our standard of living. This objective concerns both reducing the need for energy (for example, by designing houses that need less heating), and improving the efficiency with which it is used (for example, through more efficient boilers and better insulation). We aim to make the West Midlands an example of best practice that the rest of the country can follow.

Increasing the use of Renewable Energy Resources

Energy from renewable sources produces practically no net emissions compared with energy from fossil fuels such as gas and oil. Technological priorities and targets for installing renewable energy plants and systems need to be chosen to reflect the availability of resources in the West Midlands, suitability of the different technologies to meet the region's needs and their relative cost.

Maximising Uptake of Business Opportunities

By becoming more energy efficient, businesses can improve their profitability. In addition, excellent business opportunities are emerging as a result of changes in the patterns of energy production, distribution and use. To help businesses take full advantage of these, the quality and effectiveness of business support needs to be improved. Harnessing research and development and innovation skills in the region will also be an important factor here.

¹ Our Energy Future – Creating a low carbon economy. DTI February 2003

Ensuring Focused and Integrated Delivery and Implementation

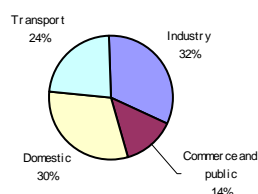
Regional and local agencies have powers to directly influence patterns of energy use, for example through planning control, construction of new buildings, vehicle fleets and energy purchasing. Such decisions also give signals to the energy market, for example by favouring certain technologies and approaches. The aim of the Strategy is therefore to ensure that these direct influences and signals are correct and consistent. Regional organisations will need to provide the leadership and funding required for its effective delivery.

A number of existing mechanisms and programmes are designed to reduce energy use. Part of the Strategy's role is to influence these to ensure that they provide a good match to the region's specific needs. This Strategy also has a role to play in enabling the flow of regional views on national energy policy to central Government.

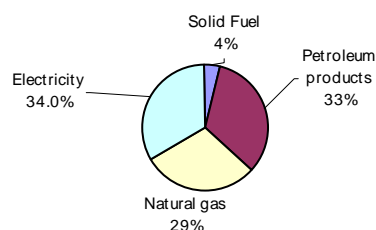
Current Emissions

It has been estimated that in 2002 the energy used by the people and businesses of the West Midlands resulted in 42 million tonnes (Mt) of carbon dioxide being released. This is approximately 10% of the UK total. The split between sectors and energy sources is shown below:

Emissions by Sector (2002)



Emissions by Source (2002)



To be in line with the national target for tackling climate change - a 60% reduction in emissions by 2050 - this total needs to reduce to approximately 38 Mt by 2010, to 33 Mt by 2020 and to 17 Mt by 2050.

Targets

Targets have been defined against each of the four key objectives as follows:

Improving Energy Efficiency

Some of these reductions are likely to occur as a result of existing activity. The full targets will not be reached without additional effort inspired by this Strategy. The separate targets for each sector are given below:

Industry: Reduce CO₂ emissions by 2.4 Mt (18%) by 2010 and an additional 4.3 Mt (32%) by 2020.

Commercial and public sector: Reduce emissions by 2.0 Mt (36%) by 2010 and an additional 1.5Mt (26%) by 2020.

Domestic: Reduce emissions by 2.4 Mt (19%) by 2010, and an additional 3.7 Mt (29%) by 2020.

Transport: Stabilise emissions by 2010 and reduce by 0.7 Mt (7%) by 2020.

*Combined Heat and Power*²: A stretching target of 1,000 MWe³ by 2010

Increasing the use of Renewable Energy Resources

The national target is 10% of electricity supplied to come from renewable sources by 2010 and 15% by 2015. Having considered the resources of the West Midlands this Strategy recommends:

Renewable generation equivalent to 5% of electricity consumption by 2010 and 10% by 2020. The 2010 target is equivalent to: up to 75 MW of landfill gas fuelled generators, 100 1.5 MW wind turbines and 27 1MW biomass/biogas powered generators.

Heat from renewable sources providing 250 GWh (0.3% of consumption) by 2010 and 650 GWh (1% of consumption) by 2020.

Production of 460 GWh of liquid biofuels per year (approximately 44 million litres - 2% of current diesel sales) by 2010.

Maximising Uptake of Business Opportunities

- To more accurately assess the level of implementation (and hence emission savings) of the existing advice provided.
- To increase the number of companies who take up the Carbon Trust's energy efficiency advice (formerly Action Energy) – for example through promotion by Local Authorities, trade associations and public sector providers of business advice.
- Periodic company surveys measuring energy efficiency related investment and sales of energy efficiency and renewables products.
- Ensure local procurement guidance to Local Authorities includes energy issues.
- Ensure that publicly funded business diversification and creation support recognises the significant opportunities that are available from the supply of low carbon goods and services.
- Ensure that the particularly strong prospects for low carbon technologies are recognised in the strategies relating to innovation and business academic links.
- The development of targeted courses and training to meet known skills shortages.
- Career awareness raising amongst 14 to 19 years old – stimulating and rekindling interest in 'making things' by focussing on the environmental benefits.

Ensuring Focused and Integrated Delivery and Implementation

- Establish a Regional Energy Office and Energy Advisory Group by April 2005.
- Formulate a detailed action plan by October 2005.

Action Plan

In order to ensure effective delivery of our objectives, a two-phase action-planning process will be necessary. **Phase 1 is set out below** and identifies the early actions regional partners can take. However, we recognise that a broad range of regional, sub-regional and local partners across sectors will need to be involved in the more detailed delivery of the strategy's objectives. Therefore we propose a Phase 2, where regional organisations will engage this range of partners in more detailed action-planning and assigning actions and responsibilities.

² Combined heat and power is the simultaneous generation of heat and power (usually electricity) in a single process. This offers improved overall efficiency (and hence emission savings) in comparison to the standard arrangement where electricity is provided from large centralised power stations and heat from local boilers.

³ Megawatt electrical. CHP output is defined in terms of both electrical and heat output.

Improving Energy Efficiency

- *Encourage energy efficiency across all sectors*

Open negotiations to get 'commitment agreements' with related strategies to identify their fair share of the relevant target(s)

- *Improve regional support and delivery of national programmes*

Measure and support the extension of the Carbon Trust and Energy Savings Trust activities. Improve the utilisation of existing resources and programmes by developing specific regional activities that focus on the priorities identified.

- *Take up the potential available to reduce energy use in buildings*

Develop a Regional Design Framework to improve energy efficiency in buildings.

Declare Energy Action Areas to act as a regional showcase.

Increasing the use of Renewable Energy Resources

- Local authorities to encourage proposals for the use of renewable energy resources, through their Development Plans.
- Promote the deployment of mature and near market technologies in the region (wind, larger run of river hydro, biomass)
- Promote the deployment of renewables in areas off the gas grid (solar thermal, heat pumps, biomass).
- Promote domestic renewable energy (PV, wind etc).
- Agree a target for liquid biofuels for transport production and use.

Maximising Uptake of Business Opportunities

- *Develop the West Midlands as a leading supplier of low carbon goods and services*

Promotion of business opportunities and of the business benefits from energy efficiency

Promote diversification opportunities and supply chain opportunities.

Build on the innovative capabilities in the region – linking universities with manufacturers, identifying opportunities in both urban and rural areas.

- *Skills development*

Address skills shortages in installation and manufacture of energy efficiency and renewable energy technologies.

Ensuring Focused and Integrated Delivery and Implementation

- *Leadership and Organisation*

Create a Regional Energy Office and Regional Energy Champion. The exact nature of the REO will be reached following a consultation exercise.

Provide a regional voice on national energy issues, Improved co-ordination of domestic energy efficiency funding, Establish a forum of organisations concerned with the eradication of fuel poverty.

- *Policy co-ordination*

Consistency of local development frameworks. Consider energy efficiency and renewables in planning applications passed for comment. Raise awareness of energy issues amongst Local Strategic Partnerships.

- *Transport policy links*

Apply and implement the goals of the multi-modal study to the whole region.

Prioritise public transport schemes in urban areas.

- *Region specific data is needed*

Establish a monitoring and evaluation framework for the strategy. Report annually.

The following have been identified as **Key Enabling Organisations** for the action plan.

Regional Public Sector Organisations

Local Authorities, Advantage West Midlands, West Midlands Regional Assembly, Government Office West Midlands, Carbon Trust, Energy Savings Trust, Centro, Housing renewal areas, Marches Energy Agency, Business Link, Health Authorities and Trusts, Learning and Skills Council, Regional Observatory. West Midlands Local Government Association

National Public Sector Organisations

DTI, DfT, DEFRA, NHS Estates, Ofgem

Representative Organisations

Trade associations, Manufacturing Advisory Service, West Midlands Business Council, West Midlands Chamber of Commerce, Engineering Employers Federation, National Farmers Union

Private Sector

Housing Developers, Public transport operators, Housing landlords, British Sugar, BIP biodiesel.
Energy Supply Industry, Npower, British Gas, Central Networks, Powergen, National Grid Transco

Contents

1. INTRODUCTION AND CONTEXT	1
1.1 Our Vision for the West Midlands	1
1.2 Why Have a West Midlands Energy Strategy?	2
2. OBJECTIVES - WHERE SHOULD ACTIVITY FOCUS?	4
2.1 National Policy Goals and Regional Influence	4
2.2 Policy Levers Available in the Region	5
2.3 Key Objectives	6
3. BASELINE - WHERE ARE WE NOW?	10
3.1 Regional Energy Use and Emissions	10
3.2 Energy Supply in the West Midlands	17
3.3 Summary of Baseline Indicators	19
4. TARGETS - WHERE WE NEED TO BE	21
4.1 The Overall Target	21
4.2 Energy Efficiency Targets	23
4.3 Renewables Targets	25
4.4 Business Opportunities Targets	25
4.5 Skills	28
4.6 Implementation Targets	29
5. IMPLEMENTATION FRAMEWORK - HOW, WHO AND WHEN?	30
5.1 Table of Actions	30
5.2 Risk Assessment	36
ANNEXE A: BASELINE EMISSIONS	38
ANNEXE B: EXAMPLE SECTORAL ENERGY EFFICIENCY MEASURES	41
ANNEXE C: GLOSSARY OF TERMS	44
ANNEXE D: OTHER STRATEGIES OF RELEVANCE	48
ANNEXE E: RENEWABLES	50

1. Introduction and Context

Urgent action is required to address the climate change challenge, which is recognised as perhaps the most important threat facing the world today. At present we rely on fossil fuels for our energy, but burning fossil fuels releases the greenhouse gases which cause climate change. In central England, we are already seeing evidence⁴ that the climate is changing:

- During the 20th century, the annual mean temperature rose by about 1°C.
- The 1990s (1991 to 2000) were exceptionally warm by historical standards.
- Three of the four warmest years in the last 230 years have occurred since 1990.

In future, we may expect⁵

- Increased risk of winter flooding, caused by winter precipitation increasing by up to 20% by the 2050s;
- Average annual temperatures in Birmingham to rise by between 1.0°C and 2.5°C by the 2050s;
- More extreme weather events and mean winter wind speeds increased by 4% by the 2050s; and
- Higher sea levels.

These will all have implications for health, agriculture, wildlife and landscape and the protection of property. While cold-related deaths are likely to reduce substantially, heat-related summer deaths may rise, as will cases of food poisoning. Farmers will need to adapt to the changing climatic conditions, which will cause significant changes to the cropping season, water availability, pests and diseases. Indigenous flora and fauna will come under pressure as the climate changes. More extreme weather events will affect emergency planning by local authorities. Business operations will be affected, as markets change and demand for products and services alters, while disruptions to services may affect business operations.

Elsewhere in the world the impacts of climate change will be more extreme and generally negative. An increase in average temperatures in countries already suffering from famine and disease could precipitate a humanitarian disaster. Even small increases in temperature could leave many areas of the globe uninhabitable. These negative impacts are likely to outweigh any positive benefits arising from climate change, such as shifts in cropping regimes in temperate regions due to longer growing seasons. These global impacts will, directly or indirectly, affect the West Midlands and we have a duty to play our part in reducing them.

1.1 Our Vision for the West Midlands

Our vision for this Strategy is that:

⁴ Hulme et al (2002). Climate change scenarios for the United Kingdom: the UKCIP02 scientific report. Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich.

⁵ The Potential Impacts of Climate Change in the West Midlands. Sustainability West Midlands. 2004

By 2020 we will have delivered the West Midlands' commitment to the climate change challenge, having ensured a sustainable, secure and affordable supply of energy for everyone and strengthened the region's economic capability.

The vision summarises the following points:

A sustainable supply of energy. The aim is to cut greenhouse gas emissions by reducing energy demand and increasing the use of low emission renewable energy sources, such as wind and biomass.

A secure energy supply. Modern society needs a reliable energy supply. By reducing demand and increasing the amount of energy sourced from regional renewable sources the West Midlands and the UK as a whole will become less dependent on the finite fossil energy reserves of other countries.

An affordable supply of energy. The Strategy must contribute to reducing the number of people who cannot afford to heat their homes.

Strengthening economic capability. There are business opportunities through improving energy efficiency (producing the same output at a lower energy cost) and providing the new goods and services required by the future energy industry.

1.2 Why Have a West Midlands Energy Strategy?

The Government's Energy White Paper⁶ identified major challenges for UK energy policy: the environmental threat from climate change, the decline of indigenous energy supply, and the need to update much of the UK's energy infrastructure over the next two decades. To address these challenges, the White Paper identified four goals for the UK's energy policy:

- Cutting UK carbon dioxide emissions by 60% by 2050, with real progress by 2020
- Maintaining reliability of energy supplies
- Promoting competitive energy markets
- Ensuring every home is adequately and affordably heated.

Achieving these goals will be a challenge that must be addressed not only at the international and national level, but also through regional efforts – such as those included in this Strategy. A positive response from the West Midlands will bring the region benefits such as:

- Improving our competitiveness through improved energy efficiency
- Reducing the number of homes which are not adequately or affordably heated
- Improved air quality
- Ensuring that the region makes the most of the diverse business opportunities which will emerge
- Reducing regional contribution to climate change gases
- Supporting a step change towards achieving a low carbon economy in the region.

If the region fails to respond these benefits and opportunities may be lost.

⁶ Our Energy Future – Creating a low carbon economy. DTI February 2003

This Strategy is intended to set clear targets for the West Midlands and to set out how the region's energy objectives will be delivered by working in partnership with others.

Box 1: The West Midlands in 2020

If the West Midlands firmly embraces the opportunities that this Strategy seeks to promote the region will change in a number of positive ways. With concerted effort we could achieve all of the following by 2020:

- All new housing is designed to minimise energy use. This stretches from simple measures such as orientation to maximise solar gain to the routine consideration and inclusion of district heating schemes. This has a number of other positive effects such as decreasing energy costs and improving quality of life for those living in the West Midlands and providing work to manufacturers, designers and installers of energy efficient building products.
- The energy efficiency of existing housing stock in the West Midlands has significantly improved. This is being partly funded through the Energy Efficiency Commitment⁷. This funding was secured thanks to a commitment from every Local Authority in the region to actively promote this funding to every household in the West Midlands. This promotional activity is targeted at people who were identified as being most at risk from an inability to affordably heat their homes. The work is carried out by local installation companies leading to the creation of jobs and retention of expenditure within the West Midlands.
- Every office and shop built or refurbished is encouraged to take up advice on how to minimise energy use. This advice is made available in a regional scheme part funded by the Carbon Trust.
- Obtaining energy from renewable sources is common practice. There are both large scale and small scale wind turbines generating electricity for communities who have been engaged and consulted throughout the process and who are enthusiastic about the benefits the development has brought (partly thanks to the Community Renewables Initiative). Ground source heat pumps are contributing to the space heating requirements of many homes, factories and commercial buildings. Cost-effective small-scale hydro schemes have been installed. Locally produced biomass is a common heating fuel choice particularly in areas without a mains gas supply.
- There are a significant number of industries in the West Midlands involved in the supply chain of the renewables supply industry. There is also significant employment in insulation installation. A low carbon technology has been developed in a West Midlands University and is now a major income generator.
- Over 10,000 industrial sites in the region have improved their resource efficiency and in so doing have reduced their costs and demonstrated innovation. This has given them a competitive edge over industries in other UK regions and elsewhere.
- The region is well on the way to achieving its target for combined heat and power installations. This has led to the development of a sector employing over 500 people to install and service them.
- There is now a clear route for West Midlands energy consumers' needs to be communicated to Ofgem and Energy Watch. This has led to the approval of expenditure to improve the quality of electricity supply in a high technology business park with voltage sensitive equipment. Funding was also approved to improve the quality of supply to over 10,000 rural customers.
- The awareness raising activities of the regional Energy Office and the Local Authorities have led to a majority of the regional population being aware of the contribution they can make to reducing carbon dioxide emissions through reducing their energy use.
- Thanks to improved take up of green travel plans, flexible working arrangements and investment in public transport the number of journeys to work by car have reduced by 25%.
- The West Midlands has a thriving biofuels industry. This has generated employment and income for farmers in growing energy crops and processors in collecting the crops and turning them into fuel.

⁷ The Energy Efficiency Commitment is an obligation on energy suppliers to fund domestic energy efficiency measures – normally done in the form of grant aid to consumers.

2. Objectives - Where should activity focus?

This section considers what the objectives of the West Midlands Strategy should be. In order to arrive at these, consideration is given to national energy policy goals and the powers that regional organisations have to help achieve these goals. Energy supply and use are influenced by an enormous number of factors, and in developing this strategy it has been necessary to recognise that the region cannot seek to influence them all.

2.1 National Policy Goals and Regional Influence

There is much the region can achieve, but some objectives will rely more on national action. The table below sets out what we believe the West Midlands can realistically achieve on a regional basis, as well as those areas where national policy and action is more significant

National Policy Goal	Regional Influence
Cutting UK carbon dioxide emissions by 60% by 2050, with real progress by 2020	The most effective way to cut carbon emissions from energy is to use energy more efficiently. The motivation to become more energy efficient largely depends upon the price of energy and the payback of energy efficiency investment (though other barriers do exist). Some of the methods to encourage improved energy efficiency are nationally organised e.g. The Carbon Trust and Energy Savings Trust. Their activities should be prioritised to meet regional needs. In addition, a strategy that seeks to replace carbon intensive sources of energy with less intensive carbon sources can help e.g. renewables and CHP.
Maintaining reliability of energy supplies	The West Midlands draws its energy from a national market. The region's ability to exercise control over the ultimate sources of its energy or the fuel mix is, therefore, limited. Responses to the carbon target that involve a greater use of renewable energy and heat may change this over the longer term but to a limited extent by 2020 (this Strategy's current benchmark). Spending on the maintenance and upgrading of the electricity and gas distribution system is regulated at a national level, at present regional organisations have no input into the discussions concerning this spending.
Promoting competitive energy markets	The supply of energy is largely controlled by large companies operating in generation, transmission, distribution and retailing. The market is driven by price signals including those from the national regulatory framework. The region has no real lever of power to exercise in relation to promoting competitive energy markets beyond making its views on issues such as fiscal policy relating to energy prices known at a national level.
Ensuring every home is adequately and affordably heated.	It has been estimated that in 2001, energy costs exceeded 10% of income for 228,000 households in the region. Some of the actions related to addressing this lie within the control of national benefits policies. However, regions play a role in terms of their general approach to securing economic development. Also some national programs on fuel poverty are delivered regionally and opportunities exist to link the alleviation of fuel poverty with business opportunities (e.g. in terms of implementing energy efficiency actions).

This analysis makes it clear that regions have a stake in the way national energy priorities are set. Competition policy or changes in benefits or decisions to change national programs all impact on how effectively regions can perform around this agenda.

2.2 Policy Levers Available in the Region

Regional partners have significant statutory responsibilities and other powers of influence which can be used to exert pressure and send positive messages to the people and businesses of the West Midlands and the energy market:

1. **Planning.** There are a number of planning powers available at regional and local levels, as follows:
 - *Regional Planning Guidance* - This was approved by the Government in June 2004. Among its main tasks is setting out how much new housing will be directed to individual county and metropolitan authorities, providing the criteria for the location of strategic employment sites and integrating these with strategic transport proposals. The guidance also takes a proactive approach to renewable energy provision and energy conservation with specific policies on energy generation (EN1), including criteria for the location of renewable energy schemes, and energy conservation (EN2), requiring local authorities to develop policies to minimise the energy demands from development and encouraging good quality combined heat and power (CHP) schemes.
 - *Regional Spatial Strategy* - With the enactment of new planning legislation RPG will automatically become the Regional Spatial Strategy (RSS). Local authorities will then have to ensure that the development policies in their local development frameworks (LDFs) are in general conformity with RSS. In addition to this duty the Planning Act has made the Regional Planning Body (RPB) a statutory consultee for regionally significant planning applications. Where larger applications are exceptions to Development Plan Documents and may impact upon the RSS, the RPB will be able to comment on them.
 - *Planning Policy Statement 22 (PPS22)* - Published in August 2004, PPS22 is the revised national planning policy statement for renewable energy in England. It provides a clear framework of objectives and issues to be considered by regional and local planning authorities across the range of renewable energy technologies.
 - *Comment on Strategic Applications* - Advantage West Midlands has a right to comment on strategic infrastructure projects and major employment sites in relation to their impact on the Regional Economic Strategy. This right is to be extended shortly to cover a much larger range of strategic developments. Government Office for the West Midlands' role in planning is to ensure prompt and defensible decisions are taken on planning casework in line with national planning guidance and regional strategies. Their role is also to promote an efficient planning system which delivers high quality and sustainable development in the light of the Governments planning reforms. These roles give the opportunity to influence the physical development of the West Midlands.
 - *Local Authorities.* Local Authorities have a considerable influence over the siting and design of new developments through local development documents and the determination of planning applications.
2. **Building Regulations.** The enforcement of building regulations is a Local Authority responsibility. These include minimum standards for energy performance, which are expected to become higher in 2005 and 2010.
3. **Housing.** Through the Regional Housing Strategy (prepared by the Regional Housing Partnership) and Local Housing Strategies there are opportunities to ensure that housing policies are consistent with the new strategic approach to energy. For example increasing the priority given to energy efficiency, renewables and district heating in the allocation of housing spending is a major opportunity.
4. **Transport.** The West Midlands Regional Transport Strategy, which is integrated into the Regional Planning Guidance, aims to enable the development of better transport within, to and from the region. The Transport Partnership which is responsible for the Regional Transport Strategy and for identifying regional transport priorities includes members of the Regional Assembly, transport providers, the Highways Agency, Strategic Rail Authority, Government Office West Midlands, Advantage West Midlands, Sustainability WM, WMLGA, business sector, freight, and user groups. The Transport Strategy is an important influence on Local Transport Plans. Local Transport Plans are prepared by Local Authorities and are the basis for allocating resources for local transport capital expenditure. The Government Office works with the Department for Transport to appraise

Local Transport Plans and Annual Progress Reports and advises Local Authorities on transport policy.

5. **Regeneration.** This spending under the control of Advantage West Midlands, local partnerships (particularly in Regeneration Zones) and developers involves significant property and community development. Consistency with the aims of this Strategy in this spending offers an opportunity to help ensure that the communities and businesses affected are made more sustainable. For example job creation from energy efficiency (including community heating and CHP schemes) and renewable energy projects, communities with good access to public transport and the creation of energy efficient homes and other buildings.
6. **Competitiveness.** The changes in energy production, distribution and use will generate significant opportunities for the businesses of the West Midlands. Public expenditure on business and innovation support (for example through the Regional Economic Strategy and the Innovation Strategy led by the regional development agency Advantage West Midlands) can be influenced in a way that recognises the importance and benefits of reducing energy emissions and the large scale opportunities that exist. For example; business support which values energy efficiency improvements and the uptake of CHP and renewables, and innovation support for new or diversifying businesses (ideally utilising regional academic innovation) in renewables and energy efficiency. Regional organisations can also help support regional energy distribution companies in their lobbying to Ofgem for approval for funds to upgrade the quality of electricity and gas supplies.
7. **Skills Policies.** The Learning and Skills Council, Sector Skills Councils, Local Education Authorities, regional Universities and training providers have a role to play in identifying skills needs in the energy sector and working to meet these needs. The Framework for Regional Employment and Skills is a key strategy here.
8. **Health and Welfare.** Regional health authorities and hospital trusts have control over significant budgets. This spending can be directed in a way that reflects the goals of this Strategy (energy efficient health sector buildings). There is also a role for the health and social services sector in the targeting and delivery of actions to achieve affordable warmth as well as in the promotion of healthy lifestyles with energy benefits, such as promoting walking as opposed to car travel. Local Authorities also have the opportunity to use their Well Being powers to promote the aims of this Strategy.
9. **Provision of information.** The West Midlands Regional Observatory clearly should have a lead role in ensuring that the generation and use of energy within the West Midlands is adequately recorded and distributed to people making decisions in this policy area.
10. **Regional delivery of national mechanisms.** There are a number of national levers which have regional delivery. There is an opportunity for regional organisations to influence these, for example the work of the Carbon Trust and the Energy Savings Trust.
11. **Advocacy and Marketing.** There are a number of ways in which all the key stakeholders in this Energy Strategy have the opportunity to apply and deliver its priorities within their own set of activities. The Regional Sustainable Development Framework has an important role here, as it does across all of these levers.
 - *Leading by example* - For example green procurement, energy efficient building and vehicle specifications and flexible working arrangements.
 - *Awareness raising* - A key element of increasing the uptake of energy efficiency and renewables is improving people's awareness of the possibilities and convincing them that everyone has a role to play in reducing carbon dioxide emissions.
 - *Lobbying for change* - While regional organisations will do all that they can to deliver the objectives of the strategy, a lot of the levers of power lie with others, particularly central government. Making the feelings of the region known at a national level and demonstrating how positive progress can be achieved can influence national policy.

2.3 Key Objectives

The following four objectives have been identified as being of key importance in achieving the energy savings and reductions in emissions required in the West Midlands. Energy efficiency

is the priority objective. It is at the top of the energy hierarchy, and as well as providing the largest potential for energy savings, it also brings economic and social benefits.

2.3.1 Improving Energy Efficiency

The most effective way of reducing emissions from energy is to use less. We should seek to reduce the amount of energy we use without compromising our standard of living or reducing our economic output. We will seek to establish the West Midlands as an exemplar of best practice and the leading region in promoting and implementing energy efficiency.

We should encourage the uptake of opportunities to improve the efficiency of the conversion of fuel into useable energy, for example through increased use of CHP.

The Carbon Trust and Energy Savings Trust already have established national mechanisms for supporting energy efficiency in the business and domestic sector. The added value and relevance of this advice to the region should be measured and improved.

Buildings are huge consumers of energy. Our national minimum energy standards are comparatively low. The Strategy needs to find a way of influencing builders and developers to design and construct buildings in a resource efficient manner to higher standards of efficiency, and to consider the use of renewable energy. Through PPS22 (see 2.2 above), local authorities should develop clear guidance to maximise the use of renewable energy in the built environment. The implementation of the EU Energy Performance of Buildings Directive will have significant impacts on raising minimum energy performance standards in larger buildings.

2.3.2 Increasing the use of Renewable Energy Resources

Energy from renewable sources produces practically no net carbon dioxide emissions in comparison to energy from fossil fuel. The West Midlands has comparatively less potential for developing renewable energy than some regions. For example, it is the only region in England with no coastline, and therefore has no potential for offshore wind or wave energy. Targets and priorities for the uptake of renewable energy need to reflect the availability of regional resources and those technologies (including heat) which the region can benefit most from. The relative costs of the technologies will also be a key factor in the decisions which renewable energy developers make.

There are a number of sites in the region where renewable energy schemes using mature and near market technologies (wind, larger run of river hydro, biomass) could be installed.

The West Midlands has areas not connected to the gas grid. In these areas there are a number of technologies (solar thermal, heat pumps, biomass heating) with strong potential.

There are significant opportunities for renewable energy schemes at the domestic scale.

Producing and using liquid fuel derived from biomass for transport and heating has the potential to reduce emissions as well as offering agricultural employment in crop production and employment in processing the material into fuel.

2.3.3 Maximising Uptake of Business Opportunities

If energy-related emissions are to be reduced there will be major changes to the way energy is produced, distributed and used. These changes will present three main types of opportunity to the businesses of the region. Businesses will need effective support to enable them to take advantage of these opportunities.

Improving energy efficiency in industry (producing the same output but using less energy in the process) reduces energy costs and therefore has a positive impact on the bottom line.

Improvements in resource efficiency and productivity, and the use of energy efficient products, processes and services, help to contribute towards increased competitiveness.

The demand for more energy-efficient and renewable energy products, processes and services will increase. This will provide a dynamic environment for innovation and increased sales.

As in other regions, there is a lack of some existing sector skills which may increase as skills needs change. If the West Midlands is to take full advantage of the business opportunities that changes to energy supply and demand will present, it will be essential to address the shortage of skills in applying and producing energy efficiency technologies and the running / maintenance of the energy supply chain.

2.3.4 Ensuring Focused and Integrated Delivery and Implementation

In order for this Strategy to be a success it needs continual high-level support and ownership. However, it will also be necessary for a clear lead to be established on energy issues. As well as providing a championing voice within the region, this would also allow the views and interests of the West Midlands to be more clearly communicated to those responsible for national decisions affecting energy policy such as DTI, DfT, Defra and Ofgem. It is therefore proposed that a Regional Energy Office should be created. An Energy Champion should be appointed to provide a figurehead for delivery. Seeking funding for this office must be an early action; this funding must be of a level and duration sufficient to achieve real progress. The proposal is for the Regional Energy Office to be under the direction of the Regional Assembly and an Energy Advisory Group. The establishment of the Regional Energy Office and defining the details of its operation will be a consultative process.

Regional organisations are responsible for a range of strategies which will have an important role in ensuring the delivery of the West Midlands' energy objectives (see Annexe D). Regional Planning Guidance⁸ is one of the key strategies that could fundamentally affect energy supply and use in the West Midlands. Planning and building regulations are key issues for energy efficiency standards, the development of renewable energy, combined heat and power, district heating and upgrading energy distribution. It is essential that Regional Planning Guidance supports local authorities in making appropriate decisions that support the region's energy objectives.

Other key strategies that could potentially affect energy supply and use include the Regional Transport Strategy⁹, Housing Strategy¹⁰, Economic Strategy¹¹, Innovation Strategy¹² and

⁸ West Midlands Regional Assembly,

⁹ West Midlands Regional Assembly, as part of Regional Planning Guidance

¹⁰ The Regional Housing Board, led by Government Office for the West Midlands

¹¹ Advantage West Midlands

Framework for Regional Employment and Skills¹³. It will be necessary to ensure that all of these strategies take into account the region's energy objectives and recognise their role. The Regional Sustainable Development Framework¹⁴ has a key role in supporting those developing and reviewing regional strategies in incorporating energy objectives. The National Strategy for Sustainable Development (NSSD) is currently out to consultation and will come into effect in spring 2005. NSSD will shape overall priorities, actions and the interconnectedness between strategies and government departments, with an emphasis on delivery. Energy issues may impact on the NSSD, particularly where there may be cross departmental responsibilities or common barriers or issues.

There are a significant number of energy related initiatives and programmes currently being run in the region. Some of these initiatives originate internationally (e.g. European Commission) or nationally while others rely on local government for support. Some programmes are only aimed at particular sectors or sub regions. The impact of many of these initiatives is not clear and overall the implementation of support schemes could be better coordinated.

Setting priorities and monitoring progress can only be done meaningfully if region-specific data on energy use are available. The data should cover actual annual consumption within regional boundaries and on a sectoral and sub-regional basis and should be available on a consistent basis agreed by all of the regions. Sub-regional data will allow accurate spatial targeting of efforts to where they are most needed and can have the greatest impact. At present much of the baseline data is based on estimates from national energy data. Data prepared in this way will not accurately show region-specific changes. There are a number of potential data sources that would enable the identification and targeted help of those most at risk of fuel poverty.

¹² Advantage West Midlands

¹³ The Regional Skills Partnership

¹⁴ Led by Sustainability West Midlands and the Regional Assembly.

3. Baseline - Where are we now?

The consensus is that greenhouse gases are the cause of climate change. Energy use is the main source of greenhouse gases and carbon dioxide (CO₂) is the main human controlled greenhouse gas. This section presents the most recent available estimates of energy consumption in the West Midlands (measured in GWh¹⁵) and related emissions in kilotonnes of CO₂.

The characteristics of energy supply and use in the region will have a strong influence on the opportunities for future emission reductions. The following section describes the key energy supply and demand sectors in the West Midlands.

3.1 Regional Energy Use and Emissions

The following table shows an estimate of Final Energy Consumption¹⁶ in the West Midlands in 2002. The total final energy consumption and emissions are 9.6% of the UK total¹⁷. The electricity and gas consumption are respectively 9.9% and 9.8% of the UK total.

Table 1: West Midlands Final Energy Consumption Estimate 2002

	Total (GWh)	Total (kt CO ₂)
Industry	47,578	13,229
Commerce, public sector	18,925	5,643
Domestic	51,330	12,644
Transport	42,154	10,138
Total	159,987	41,653

Source: DUKES, NOMIS, Mike Ward Associates, Inverewe Consulting, WM Multi Modal Study

Estimates for industry, commerce and the public sector are calculated by applying the regional percentage of national employment in those sectors to national data¹⁸ on energy use in those sectors. The estimate for the domestic sector has been calculated by applying the percentage of the national population in the West Midlands to the national figures for domestic energy use. The transport figure is based on a regional estimate of petroleum products delivered for road transport purposes plus rail oil and electricity use based on the percentage of national passenger kilometres in the West Midlands. Annex A shows a breakdown by energy source as well as sector.

Energy used at the airports in the West Midlands (Birmingham International and Coventry) has been excluded from this baseline in this Strategy. This decision follows the approach taken by the Energy White Paper. International aviation emissions currently do not count in the national inventories of greenhouse gas emissions, and there is no international agreement yet on ways of allocating such emissions to one region, or even one country.

This analysis by end user allocates the emissions from power stations to those using the electricity. Losses in the distribution system are not included. There are other non energy

¹⁵ Gigawatt hour

¹⁶ Final Energy Consumption - Energy consumption by final user - i.e. which is not being used for transformation into other forms of energy. Energy used in power stations is therefore excluded.

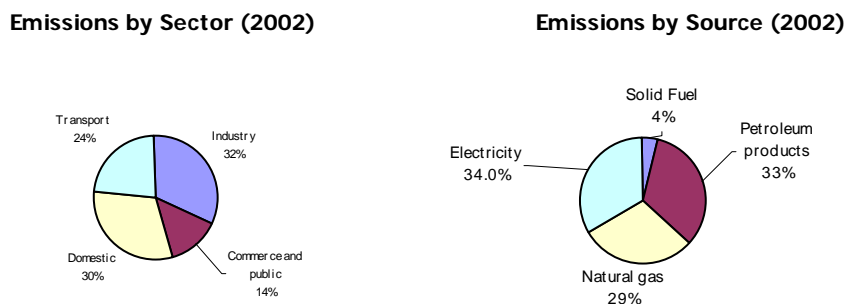
¹⁷ This is the UK Final Energy Consumption total, minus air transport and non energy use of fuels.

¹⁸ National data from the DTI Digest of UK Energy Statistics (DUKES), table 1.1

sources of CO₂ and other greenhouse gases in the region. These have not been included in this Strategy as their control is not an energy related issue. This strategy has also not considered the possibilities of CO₂ sequestration as this is not considered to be an action that single regions can follow.

Domestic energy consumption is the largest sector closely followed by industry and transport. In terms of emissions by source, electricity and petroleum products are the most significant.

Figure 1: Final Energy Consumption CO₂ Emissions Percentage Split



The following sections describe each sector in more detail, illustrated with examples of good practice activities that have occurred in these sectors in the West Midlands.

3.1.1 Industry

The West Midlands is a highly industrialised region, including many industries that are high energy users, such as engineering and ceramics. Overall, manufacturing accounts for 24.7% of regional economic output though this is predicted to decline to 21.6% by 2020¹⁹. The amount of energy per unit of output has declined (i.e. energy intensity has improved) and the factories used to accommodate these less energy intensive activities are becoming smaller and less centralised. Although this shift of manufacturing to other regions in the world results in lower levels of energy use, it also has a detrimental impact on levels of employment in the region.

The West Midlands accounts for 9% of all UK employment²⁰, but it has a high percentage of total UK employment in a number of industrial sectors, such as non ferrous metals (35% of UK employment in that sector), mineral products (21%), mechanical engineering (20%) and vehicle manufacture (21%). This high occurrence implies that there should be an above UK average opportunity for the region to achieve emission reductions in these sectors, on the assumption that they have not already maximised their efficiency. However in some of the most energy intensive sectors there is a relative under-representation such as chemicals (5%), food and beverage production (8%), and paper and printing (6%). These are sectors where large-scale industrial CHP is often most attractive so the opportunities for this measure in the West Midlands may be lower than the UK average.

¹⁹ Source Forward projection of Cambridge Econometrics modelling (Advantage West Midlands)

²⁰ Source: National Statistics.

The Government introduced the Climate Change Levy²¹ (CCL) on all non domestic energy users in April 2001. In order to address the concerns of many energy intensive industry sectors that higher energy costs would be damaging to their competitiveness, it was agreed that a number of sectors could enter into CCL exemption Agreements (CCAs). Under these agreements companies are exempt from 80% of CCL provided that they reduce CO₂ emissions in line with agreed targets. Most CCAs are negotiated by trade bodies and cover a number of sites. There are over 40 such agreements in the UK covering over 10,000 sites.

Industry (along with power stations) is expected to be the major player in the forthcoming emissions trading system. This will assign an annual cap on the emissions from an installation (site) if an installation produces less than its allowance (e.g. by improving energy efficiency) it will be able to sell this credit to a site which has gone over its emission cap.

Box 2 Industrial Sector

Climate Change Agreements in the Ceramics sector

The ceramics industry in the West Midlands collectively reduced energy consumption by 10.4% and saved 65,000 tonnes of CO₂. The rebate to companies was valued at £4.5m.

At a national level through participation in the Climate Change Agreements, the ceramics industry collectively reduced energy consumption by 8.7% and saved 108,000 tonnes of CO₂. The rebate to companies was valued at £13.2 million. Targets were met in most cases through the successful reduction in specific energy consumption in production. Trading in CO₂ allowances within the new emissions market was also undertaken in some cases to ensure compliance.

The British Ceramic Confederation provided detailed advice and assistance to companies during the year through a series of seminars, workshops, and briefing documents as well as systematic monitoring and reporting arrangements to ensure that all requirements were fully understood and all deadlines for the submission of data were met.

Talbott's Biomass Boilers

Talbott's Ltd, of Stafford, was established in the 1970s by Bob Talbott who saw a need to develop methods of providing renewable energy from readily-available resources. Talbott's is a leader in the waste-to-heat sector where concerns over the burning of fossil fuels and the escalating cost of landfill are encouraging companies to invest in the company's systems that generate heat and power from wood-based waste materials.

The company now produces a range of 40 different combustion systems at its factory with energy outputs ranging from 25kW to 4,000kW per hour, of which multiples can be installed.

Now, more than 3,500 systems are in use world-wide and the company has a subsidiary in Canada, Talbott's Heating North America Ltd., which is responsible for sales into the major US and Canadian markets.

Talbott's biomass combusters have been developed largely for the agricultural and forestry industries. They are designed to combust plant and animal matter including timber waste such as brash, short-rotation crops including willow and miscanthus (elephant grass) and animal by-products, with outputs of hot air, hot water, steam or electricity.

3.1.2 Commerce and the Public Sector

This sector includes commerce (shops, offices and the hospitality sector) and the public sector. The West Midlands has experienced growth of its service sector activities in line with most of the developed world although from a lower base. By 2020, the service sector will increase its current share of regional output from 62.4% to 69.3%¹⁹. The principal energy use in the commercial and public sector relates to heating, lighting and cooling. The spaces used

²¹ The levy is charged on natural gas and electricity at the rates of 0.15 and 0.43 p/kWh respectively. Fuel oil is not subject to CCL as oil already carries duties.

range from shops and offices to warehousing - which is the biggest user of floor space in the West Midlands.

The public sector, including the educational, health and local authority sectors, operates a large number of buildings. There are opportunities for improving the energy efficiency and uptake of renewables in this building stock. The high public visibility of these buildings also means that when they demonstrate and publicise best practice these positive messages will reach and influence a large audience. The Government have announced energy targets for the central Government estate. This includes offices, prisons and MOD property but excludes hospitals, education buildings, emergency services and Local Authority buildings such as leisure centres.

Box 3: Commercial and Public Sector Energy

CHP at Birmingham University

The University of Birmingham generates a substantial proportion of its heat and power requirement on campus through a CHP scheme. The CHP energy centre includes a 7 MWe gas turbine with steam injection and a steam turbine. This allows the CHP output to be matched effectively to the site heat and power loads. This is particularly important for the University, as there is a significant difference in seasonal heat loads.

Powergen Office Westwood Park Coventry

Powergen's Headquarters consists of a 3.4 hectare site, including a three pond wetlands development, and houses over 1,100 employees. Energy Efficiency was a central theme in the design and the desire to create a healthy integrated work environment was intended. Therefore the concept of the naturally ventilated office was adopted.

The passive cooling effects of the exposed concrete are fundamental to the success of this type of structure. The inherent thermal mass of concrete reduces temperature swings, particular on hot summer days and ensures that natural ventilation maintains a comfortable working environment.

Warwickshire County Council - Low Carbon Management Programme

Warwickshire County Council have been selected by the Carbon Trust to trial their Local Authority Carbon Management Programme. This has helped Warwickshire to appraise the options for reducing carbon emissions across their full range of activities. This has included looking into improving the energy efficiency and incorporating renewables into the council building stock. Other areas that are being targeted include the emissions from the vehicles under their control and the setting up of car sharing clubs for all of the county residents. Following the success of this trial it is hoped that this support will become available to all the Local Authorities in the West Midlands.

CHP in West Midlands Hospitals

There are a number of hospitals in the region which have, or have had, CHP units installed. These include:

3.4 MW Dudley Road, Birmingham. 580 kW Good Hope, Sutton Coldfield. 410kW Rugby. 110 kW EET Shrewsbury. 110 kW Moseley Hall, Birmingham. 95 kW Nuffield, Birmingham, 2.5 MW Queen Elizabeth, Birmingham. 600kW Stafford. 600 kW Princess Royal Telford. 1MW NSRI, Stoke on Trent.

It is hope that as hospitals are replaced and upgraded this capacity will be retained and expanded.

3.1.3 Domestic

There are some 2,230,000 dwellings in the West Midlands (2001), and this number is increasing by approximately 13,500 per year. Registered social landlords are building about 10-15% of new homes, the rest are being built privately. Because of the profile of the existing housing stock (compared with the UK profile the region has fewer older homes, a higher proportion in urban or suburban areas, and a higher proportion of social housing), there is more potential than the UK average for cost-effective energy efficiency improvement measures in the region.

The mean SAP²² energy rating for the West Midlands is 48.8²³, slightly lower than the average for England of 50.6. Social housing dwellings in the West Midlands have an average SAP of 52.2, which is the lowest of all the English regions. However, social housing dwellings are significantly better on average than private sector dwellings, which have an average SAP of 47.8 in the West Midlands.

The proportion of dwellings that fail to meet the Decent Homes²⁴ standard in both the private and social housing sectors is high, and higher than the proportion for England as a whole. Overall 829,000 dwellings do not meet the Decent Homes Standard, 620,000 of which are in the private sector and 209,000 in social housing. If assumed to be typical of England as a whole, 80% of these homes fail on the thermal comfort criterion (efficient heating and effective insulation).

A number of changes in ownership and increases in capacity in the regional housing stock are occurring or due to happen soon, for example, the large scale voluntary transfer of local authority housing stock to registered social landlords and the measures being implemented in the two housing market renewal areas within the region (Birmingham / Sandwell and Stoke on Trent). These changes present an opportunity to improve the energy efficiency of significant amounts of housing.

There are already over 225,000 households in the region for whom energy costs represent 10% or more of their income (known as fuel poverty²⁵). This has serious health and welfare impacts. Households that match this description should be a priority group for energy efficiency improvements, as it will enable them to heat their homes for a lower cost. The UK Fuel Poverty Strategy (2001) set out the government's intention to eradicate fuel poverty completely by 2016, with interim targets of 2010 for vulnerable households to be taken out of fuel poverty, and all social housing to comply with the Decent Homes standard.

Box 4: Domestic Energy

Energy Wise Direct

Energy Wise Direct is a scheme funded through a grant from the Energy Saving Trust and managed on behalf of participating Councils by Hestia Ltd. It is a partnership of 19 local authorities operating a bulk discount scheme for domestic insulation, heating and renewables. The Energy Wise Direct scheme offers people in the West Midlands the chance to cut fuel costs and install energy efficient measures (such as loft and cavity wall insulation) at subsidised prices. http://www.savenergy.org/homeowner/energywise_direct.html

Sustainable Housing in Small Heath

West Midlands new Economics Group have recently completed a year long study into the application of renewable energy in an inner city neighbourhood. The report came to the conclusion that a ten year programme was needed starting with home insulation and energy efficiency and leading on to community wind turbines, photovoltaic roofs,

²² SAP - The Standard Assessment Procedure is a calculation of a dwelling's energy use. SAP ratings are scored on a scale from 1 to 120 where 1 is the worst (high energy use) and 120 the best (low energy use).

²³ English House Condition Survey 2001.

²⁴ In 2000, the Government made a commitment to bring all public sector homes up to a decent standard, establishing a 10 year target and an interim target to:

"ensure that all social housing meets set standards of decency by 2010, by reducing the number of households living in social housing that does not meet these standards by a third between 2001 and 2004, with most of the improvement taking place in the most deprived local authority areas".

This places a responsibility on councils to set a timetable for eliminating backlog repairs in their stock, carrying out ongoing maintenance and take the necessary actions to ensure these targets are met.

²⁵ If housing benefit and other support are excluded, this figure rises to 317,000. This approach was taken in London's energy strategy.

wood burning stoves and CHP plants.

Integer housing, Lyng, West Bromwich

The INTEGER scheme in Sandwell has 15 housing units featuring a range of energy efficient measures, including solar water panels. This project incorporates features that provide both passive and active solar gain. The development comprises 15 houses and flats for rent and utilises high insulated building construction to help minimise energy demand. The project achieved high SAP scores. It is estimated that annual energy demand is 30 – 40% lower than typical modern dwellings.

On the south elevation the larger house types have a conservatory acting as a passive collection device. Roof-mounted flat-plate collectors, 4m² (average) per unit, provide a contribution of 50% of the annual hot-water demand. The total cost of the solar collection system was £25,000. <http://www.integerproject.co.uk/sandwell.html>

South Shropshire Housing Association

South Shropshire Housing Association have developed a climate change strategy, and have set themselves a target of becoming carbon neutral by 2033. They have secured £30,000 of Clear Skies funding for 20 new solar water heating systems for homes in Craven Arms. They have also fitted water butts to 55 of their stock and have fitted a further 8 solar panels to other developments in Clun.

3.1.4 Transport

Transport is a major user of energy and a major contributor to carbon dioxide emissions in the region. Nationally, transport accounts for about 27% of all carbon dioxide emissions, of which road transport accounts for 94%. Between 1990 and 2001, transport energy consumption grew by 13%. Statistical evidence suggests that energy per passenger or freight kilometre has hardly changed. However, consumption has been driven upwards by the overall increase in the amount of travelling.

The West Midlands Multi-Modal Study completed in 2000 recommended a series of measures designed to reduce congestion and hence emissions below the 1996 level. This would be achieved by a combination of behavioural change, road pricing and infrastructure improvement, with each initiative contributing to approximately one-third of the total change. These measures were approved by Government Office as the basis for the transport proposals in Regional Planning Guidance and the subsequent Regional Transport Strategy.

Regional authorities and agencies are largely constrained by the national framework for transport. This particularly applies to investment in transport infrastructure and fiscal measures to encourage modal change (e.g. road pricing to encourage commuters from cars to public transport). In response to these constraints, the region has prepared a document summarising the region's Transport Priorities²⁶. These are as follows:

- Promote a change of hearts and minds of the region's population.
- Make the best use of the existing regional transport networks.
- Provide a comprehensive public transport system that serves the urban areas.
- Improve access to Birmingham International Airport and the National Exhibition Centre.
- Ensure that the West Midlands is a reliable hub to serve regional, national and international connections.

The most cost effective transport initiative to achieve energy savings is behavioural change. Persuading travellers to change their habits - mode of travel, time when journeys are made,

going to alternative destinations, etc. - can be done at relatively minimal cost. Road pricing, if sensitively applied, can persuade car drivers to avoid congested areas or times. Even if the process is revenue neutral the savings in energy consumed and harmful emissions will be a worthwhile benefit and contribute significantly to achieving Government targets.

The Transport White Paper²⁷ recognises the need to 'manage the growing demand for transport'. The strategy is built around three key themes: Sustained improvement over the long term, Improvements in transport management, and Planning ahead.

Various national policies, primarily in respect of taxation, will have negative (or at best neutral) impacts on transport energy savings. Government removed the fuel duty escalator from petrol which was designed to increase the real cost of fuel at the pump. It has also announced that the duty element of LPG will gradually be increased, but with no specific details, leading to uncertainty and little further increases in uptake of LPG as a result. Both these policies are likely to have a negative impact on reducing emissions.

The West Midlands contains a higher proportion of vehicle manufacturing activities compared to other regions. This implies that the drive to improve the carbon efficiency of vehicles will have significant impacts and offer significant opportunities for industry in the region.

The public sector in the West Midlands has control over a significant vehicle fleet (such as refuse and maintenance vehicles). There are opportunities for improving the efficiency and reducing the carbon emissions of this fleet through purchasing decisions and through using biofuels.

Box 5: Transport

Warwick future vehicles

The Technology & Information Group at the University of Warwick is a small group of researchers, with experience in applying technologies to real-world problems. They have been involved in a number of technology projects involving the development of hybrid electric vehicles for vehicle manufacturers and consumers.

A hybrid electric vehicle (HEV) is one powered by a combination of internal combustion engines and electric motors. As greenhouse gas emissions and energy efficiency becomes more important, automotive manufacturers are increasingly exploring the possibilities of HEVs.

Midland trams

The Midland Metro is a light-rail tram system in the West Midlands, which presently runs between Birmingham and Wolverhampton via West Bromwich and Wednesbury. The Midland Metro can run both separated from other traffic and safely on streets with other traffic and pedestrians. The Metro currently attracts over 5million passengers a year. The service offers a turn-up-and-go frequency and four of the stops along the way provide free car parking. All the trams and stops are easily accessible for people who are mobility impaired and also for people with pushchairs or buggies. There are plans to expand the network so bringing the benefits of a Metro system to even more people in the West Midlands conurbation.

Travel plans

A travel plan is a general term for a package of measures tailored to the needs of individual companies and aimed at promoting greener, cleaner travel choices and reducing reliance on the car. It involves the development of a set of mechanisms and targets that together, can enable an organisation to reduce the impact of travel and transport on the environment, as well as other benefits.

Birmingham City Council's Company Travel Plan now covers over 113,000 employees from 75 organisations. The aim is to help employers work with their staff to improve their travel choices and provide alternatives to the car

²⁶ See <http://www.advantagewm.co.uk/wm-transport-priorities.pdf>

²⁷ The Future of Transport a network for 2030. Department for Transport, July 2004.

especially for the journeys to work. Along with Centro and Travel West Midlands, the City Council offers numerous benefits to both the employer and employees.

Biodiesel - From Chip Shop to Forecourt

As part of the Community Renewables Initiative 100% biodiesel is now available in Shrewsbury costing about 5p/litre less than standard diesel. This is made to the European biodiesel Standard EN14214 by BIP in Oldbury from the some of the region's waste frying oil. A blend of 5% biodiesel with fossil fuel which can be used in any diesel vehicle is also now more widely available than ever with pumps springing up on the forecourts of independent fuel retailers across the West Midlands.

3.2 Energy Supply in the West Midlands

3.2.1 Energy Supply and Markets

Energy is brought to final consumers in the West Midlands through a set of fuel specific supply networks. The regulator Ofgem²⁸ exercises regulatory control on gas and electricity transmission, distribution and supply companies.

Final consumers are free to purchase energy from a range of suppliers. Market forces drive the price which the consumers pay. The forces and signals that control and influence the market are very diverse. They range from international energy commodity prices to increases in demand for products driven by tax incentives or publicity. Decisions such as whether or not to install Combined Heat and Power and the level of investment made in energy efficiency are made in the context of the energy market.

This Strategy has a role to play in sending signals to this market which encourage investments in technologies and approaches which achieve its aims.

3.2.2 Mix of generating plant

Both of the large power stations in the West Midlands are coal fired (970 MW at Ironbridge, 1,006 MW at Rugeley).

The region's renewables capacity is mainly landfill gas (36MW) and sewage gas (11MW) with minor contributions from hydropower and biomass.

There are currently 95 CHP schemes²⁹ in the West Midlands. This capacity is dominated by a small number of large schemes, with the 10 largest schemes accounting for 51MW of the total capacity.

The West Midlands has five operating municipal waste incinerators, at Coventry, Tyseley (Birmingham), Stoke, Dudley, and Wolverhampton. Energy (in the form of both electricity and heat) can be generated by burning municipal solid waste and industrial and commercial waste. Detailed consideration of waste incineration has, however, been excluded from this Strategy. This is because it is felt that it is better dealt with by the Regional Waste Strategy which will judge its relative merits in the waste reduction, recycle and disposal hierarchy. Should the waste strategy recommend solutions which involve energy recovery from waste, this should be done in as efficient a manner as possible.

²⁸ Ofgem – Office of gas and electricity markets

²⁹ Source Ofgem CHP Database.

Table 2: West Midlands Electricity Generating Capacity and Output (2002)

	Electrical Capacity (MW)	Output (GWh)
Large Power Stations	1,976	8,959
Renewables	48	211
Combined Heat and Power (CHP)	65	453
Waste Incinerators	65	484
Total	2,154	10,107

3.2.3 Renewables

In 2001, about 1% of the West Midlands' energy consumption was met from renewables generating plant located in the region, mainly landfill gas and sewage gas, with small amounts of hydro, solar thermal and photovoltaics (solar electricity generation). Heat technologies in particular (biomass, biogas, solar and ground source heat pumps) and biofuels for transport have the potential for strong growth.

The Government's target is that 10% of electricity generated nationally should be from renewables by 2010, rising to 15% by 2015. Planning Policy Statement 22 (PPS22) sets out the Government's national planning policies which it hopes will help deliver its renewable energy targets. Regional Planning Guidance for the West Midlands (RPG11) supports the national guidance and states that local authorities in their Development Plans should encourage proposals for the use of renewable energy resources. These include biomass, onshore wind power, active solar systems, small scale hydro-electricity schemes and energy from waste combustion and landfill gas, subject to an assessment of their impact using criteria-based policies.

Because of its geography the West Midlands has (relative to other regions) few economic onshore wind resources. Since wind energy is currently the main and most cost-effective source of renewable energy, in the short to medium term, renewables are only expected to make a relatively small contribution towards achieving significant carbon dioxide reductions in the region. Biomass has an important part to play in the renewable energy mix of the region in the medium to long term. There are significant opportunities for rural communities and businesses to develop biomass as an energy resource, from wood and forestry residues in the forestry sector and from non-food energy crops (miscanthus, short rotation coppice). Landscape character and biodiversity considerations should be taken into account for all of these prospects.

Annexe E provides further details about the existing situation and details of the forecast change to 2010 and 2020, based on recent studies about the scope for growth of renewable energy in the Region. It is important to note that there are a wide range of key issues that can impact on the successful deployment of renewables in the region, some of which relate to national policies or activities that cannot be addressed at the regional level. Improvements to the electrical network, which may not be able to accommodate smaller generators especially in rural areas, are being addressed at national level. The economics of renewables installations may not be favourable, especially for smaller scale installations, and grants or price guarantees are needed in order to facilitate investment.

Box 6: Renewables

Biomass supply network

Marches Wood Energy Network Ltd (MWEN) has set up a new, independent wood fuel supply business, Midlands Wood Fuel, to source and process the fuel required for the growing network of installations.

Electricity from sunlight (Photovoltaics)

The new National Indoor Athletics Training Centre at the Alexander Stadium has a 102 kW solar roof providing an annual electricity output in excess of the building's expected electrical requirements. The roof uses the latest thin-film photovoltaic technology, which generates electricity even in low light conditions. In addition to generating electricity the solar panels provide shading to the metal roof below, helping to keep the building cooler and more comfortable during the summer months. A display in the main reception area of the stadium will clearly show how much clean power the roof is generating at any time, the total energy produced to date, and the tonnes of carbon dioxide emissions prevented to date. The total cost of the project, including design, supply and installation, was less than £400K. It received £260K of funding from the DTI's PV funding programme, so the final cost to Birmingham City Council and its partners was less than £140K.

Minworth Sewage Gas Plant

The Minworth sewage treatment plant north of Birmingham includes a 9.5 MWe Generator fuelled by the gas produced from the sewage digestors. The 'free' sewage gas and new environmental and financial incentives have made it worthwhile for Severn Trent to reconsider its approach at a further 35 sites. This could lead to it being the only water company in the UK to fully utilise all sewage gas streams by converting them into renewable energy.

Buntingsdale School Ground Source heat pump

At Buntingsdale Infant School, near Market Drayton, a 40kW ground-source heat pump now heats the classrooms, replacing storage heaters which had caused over-heating problems on sunny days in spring and autumn. The school expects to cut its electric heating by more than two-thirds, saving 18 tonnes of CO₂ a year and the equivalent annual electricity consumption of 12 homes.

Shropshire County Council's Energy Conservation and Sustainable Construction Unit worked in partnership with the Marches Energy Agency (the Community Renewables Initiative's Local Support Team) and the Carbon Trust to deliver this innovative scheme. The total cost of the scheme was £75,000, of which £42,000 came from the Carbon Trust and the rest from the school itself and Shropshire County Council Property Services.

3.3 Summary of Baseline Indicators

The following headline indicators have been extracted from this section. This will make future measurement of the success of the Strategy possible and illustrate where targets should be set.

Indicator	Baseline Position
Total Carbon Dioxide Emissions	41.6 Mt / year
Energy Intensity¹	2.295 GWh/ Gross Value Added (Emillion)
Regional Electricity Consumption	32,966 GWh / year
Industrial Carbon Dioxide Emissions	13.2 Mt / year
Industrial Energy Intensity	2.333 GWh/ Gross Value Added (Emillion)
Commerce and Public Sector Carbon Dioxide Emissions	5.6 Mt / year
Commerce and Public Sector Energy Intensity	0.383 GWh/ Gross Value Added (Emillion)
Public sector Carbon Dioxide Emissions	1.7 Mt / year

Domestic Carbon Dioxide Emissions	12.6 Mt / year
Carbon Dioxide Emissions per dwelling	5.7 t / year / dwelling
Average SAP rating of homes	48.8
Homes not meeting Decent Homes standard	829,000
Households where energy cost > 10% of income	225,000
Transport Carbon Dioxide Emissions	10.1 Mt
Percentage of trips to work by car (2002)	77 %
Average annual mileage by car and no. of trips (2001)	3,588 miles and 413 trips (source: DfT)
CHP Capacity	65 MW
Renewable Electricity Generation Capacity²	48 MW
Percentage of Electricity consumption from renewables²	0.6%
Renewable Heat Supplied	14 GWh
Amount of biofuel sold per year (Estimate based on national sales)	1.7 million litres (0.1% of diesel sold)

1 Energy Intensity is the ratio of the final energy consumption of a sector to the value added generated by that sector. It is a good indicator of energy efficiency as it shows a positive trend if production becomes more energy efficient (less energy per unit of output).

The Gross Value Added figures are from 2001 as 2002 figures are not yet available. GVA is a measure of the difference between the value of inputs into a sector with the value of that sector's outputs.

2 Renewable capacity on a Renewables Obligation basis - this excludes waste incineration.

4. Targets - Where we need to be

Targets have a value in focusing activity and making aspirations more concrete. We have taken our lead in setting these targets from the data and projections contained in the Energy White Paper. This provides an assessment of the overall carbon dioxide emissions, the required reductions and the distribution of these reductions across final user sectors. Our only divergence from this is that we have assumed that transport emissions will remain effectively stable. This is partly because the White Paper transport projections include aviation, which is not included in this Strategy, but also to reflect the view of the transport professionals who contributed to the development of the Strategy.

It is important to recognise that these targets are based on the best currently available data and projections of future use. As further data becomes available in the future these targets will need to be adjusted and can be refined.

4.1 The Overall Target

In order to be on course for the 2050 target of a 60% reduction in emissions the Government states in the White Paper that by 2020 emissions need to be 11-18% lower than they would be if no additional efforts to reduce them were made. There are also UK emission reduction targets for 2010³⁰. For the West Midlands this equates to a reduction from the current 41.6 Mt of CO₂ to 38.2 Mt by 2010 and 33.0 Mt by 2020.

4.1.1 The Baseline Position

The first step in apportioning this emissions reduction target to individual energy use sectors for the West Midlands is to estimate what the emissions would be in 2010 and 2020 if this Strategy were not implemented and no additional activity took place to ensure reductions in emissions. In preparing the Energy White Paper the Government have drawn together a significant amount of detailed modelling work on predictions of future UK energy demand. The baseline position of this modelling includes the predicted impact of all current nationally led policies up to 2010 (mainly the Climate Change Programme³¹) plus emissions reductions or increases that are expected to happen based on historic trends. It also includes the impact of expected changes to the electricity generating mix, such as the expected closure of nuclear power plants. The predicted changes to baseline emissions in each sector are summarised in Annexe A.

The baseline changes in national emissions have been applied to the current regional estimate of emissions (see section 3). Figure 1 illustrates this prediction.

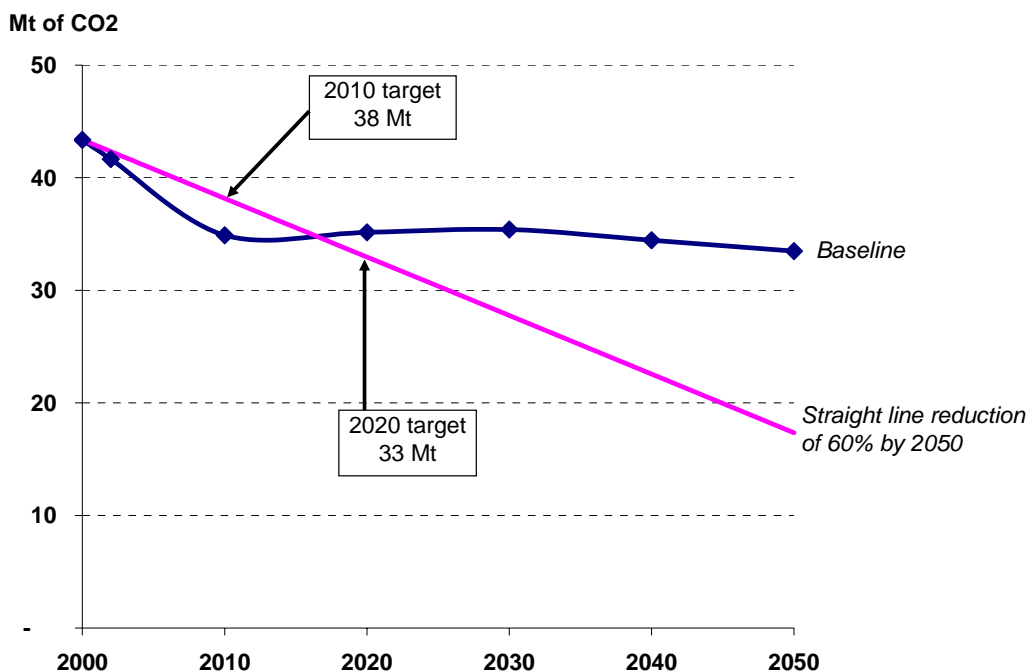
The figure also shows what a straight-line reduction to meet the 2050 target of a 60% reduction, i.e. the target, looks like. It is clear that the baseline position is expected to deliver the reductions required by 2010 but beyond 2010 additional actions at both national and regional level will be required to stay on course for the 2050 target.

³⁰ - The UK's Kyoto protocol commitment is to reduce greenhouse gas emissions by 12.5% below 1990 levels by 2008-12 with a national goal to move towards a 20% reduction on 1990 levels by 2010

³¹ The main measures are the Climate Change Levy (plus associated exemptions), Energy Efficiency Commitment and Emissions Trading.

It is important to stress that this Strategy will have a key role to play in delivering the emission savings predicted to 2010 that are included in the baseline position.

Figure 2: West Midlands CO₂ Emissions - Baseline compared with 60% reduction by 2050



4.1.2 Sectoral Emission Reduction Targets

The next step is to show the contribution of each sector to the emission reduction targets. The White Paper indicates how the different energy use sectors (industry, commerce, domestic and transport) could share the additional reductions required between 2010 and 2020. This is based on an analysis of the technically possible efficiency options available in each sector. A summary of these options is given in Annexe B.

Table 3 shows the regional sectoral reductions required in order to meet the 2010 and 2020 targets.

Table 3: Projections and Targets for West Midlands CO₂ Emissions (Mt of CO₂ /yr)

	2002 (current emissions)	2010 Target	2020 Target
Industry	13.2	10.9	9.0
Commercial and public sector	5.6	3.6	4.2
Domestic	12.6	10.3	9.0
Transport	10.1	10.1	9.4
Total ⁽¹⁾	41.7	34.9	29.5

(1) 2020 target takes account of the contributions from renewables and carbon trading

As explained above the national policies already in place are expected to achieve the 2010 target. This Strategy has an important role in making these happen via regional activities.

In order to meet the 2020 target non sector specific emission reductions are also required. The White Paper postulates that the additional savings could be achieved through reductions from two nationally led programmes.

- an increase in the uptake of renewable energy (equivalent to approximately 20% of electricity from renewables by 2020)
- carbon savings via European level carbon trading by power stations and refineries.

This Strategy will be important in delivering the first of these non sector specific reductions. The non-sector specific emissions reductions have been applied to the total emissions (after the sectoral reductions have been taken off).

4.2 Energy Efficiency Targets

Stating carbon dioxide reduction targets alone is unlikely to persuade anyone to take action to achieve them. We have therefore attempted to explain and give examples of ways in which carbon dioxide reductions can be delivered. The targets need to be explained (and examples given) in a way that allows the owners of other regional strategies to understand the role they can play in delivering them. This means converting the targets into recognisable measures. These examples are set out in Annexe B. Some of these measures are likely to occur under the baseline reduction while others will need additional effort inspired by this Strategy.

It is important to stress that the measures are not intended to describe the recommended or ideal mix. This is not felt to be the point of this Strategy and given the length of time over which this Strategy is seeking to influence decisions the ideal mix will change. The measures should therefore only be considered as examples, in order to illustrate that the targets can be achieved.

Regional Planning Guidance recognises that appropriate design and construction can avoid energy loss, minimise energy demand through the use of natural lighting, heating and cooling, allow on-site generation of heat or electricity from renewable sources, and can help reduce running costs. Policy EN2 requires local authorities to develop policies in their Local Development Frameworks which further these objectives in development, redevelopment and improvements to buildings.

The following table shows that the 2020 emission reduction target can be more than met if the population of the West Midlands can be made aware of the issues and then be convinced and persuaded to take action.

Table 4: Target Emission Reductions and Possible Efficiency Reductions (Mt CO₂)

	Target Reductions		Potential Reductions
	2010	2020	See Annexe B
Industry	2.4 (18%)	4.3 (32%)	2.3 (26%)
Commercial	2.0 (36%)	1.5 (26%)	1.5 (36%)
Domestic	2.4 (19%)	3.7 (29%)	6.4 (71%)
Transport	0.0 (0%)	0.7 (7%)	2.7 (29%)

Total	6.8 (16%)	10.2 (24%)	13.0 (31%)
--------------	-----------	------------	------------

The following section shows examples of how each sector could achieve its emission reductions. These provide **illustrations** in simple terms of the feasibility of the targets.

4.2.1 Industrial

Target: Reduce CO₂ emissions by 2.4 Mt (158%) by 2010 and an additional 4.3 Mt (32%) by 2020.

As an example, this could be achieved by installing large numbers of energy efficient motors and drives, improvements to heating and lighting systems, wide scale implementation of CHP, process re-engineering and the uptake of carbon trading.

4.2.2 Commerce and Public Sector

Target: Reduce emissions by 2.0 Mt (36%) by 2010 and an additional 1.5Mt (26%) by 2020.

As an example, this could be achieved if all commercial and public premises in the region took cost effective energy efficiency measures (such as improved controls on lighting and heating) along with an additional reduction of 0.1 Mt of CO₂ from renewables, CHP and implementing higher standards for new buildings. It is hoped that the Energy Action Areas described in the Implementation Framework will be a useful mechanism for reducing emissions in this sector as well as the other three sectors.

4.2.3 Domestic Sector

Target: Reduce emissions by 2.4 Mt (19%) by 2010, and an additional 3.7 Mt (29%) by 2020.

As an example, this could be achieved by installing energy efficiency measures (such as cavity and loft insulation and condensing boilers) on 50% of existing homes in the region.

4.2.4 Transport

Target: Stabilise emissions by 2010 and reduce by 0.7 Mt (7%) by 2020.

As an example, this could be achieved through a combination of behavioural change (5% less car trips by 2010, with an additional 10% less by 2031), a reduction in the average vehicle mileage (by 250 miles per year) and improvements in the Public sector vehicle fleet (by specifying higher efficiency vehicles, promoting car sharing and the use of biofuels).

4.2.5 Combined Heat and Power (CHP) Target

The national target for CHP is 10 GW of capacity installed by 2010. If the West Midlands aimed for a percentage of this target based on the regional share of energy demand its target would be 1,000 MW. This is a stretching target given that current energy prices do not make CHP an attractive commercial prospect. It is felt that national level structural and fiscal incentives will be needed to achieve it.

4.3 Renewables Targets

The working group has proposed a stretching target of 5% of electricity consumption³² (or 1,250 GWh) by 2010 (or 6.4% including co-firing biomass in fossil power stations), rising to 10% (1,700 GWh) by 2020. Although stretching, this target is realistic, and is achievable, particularly given the policy levers now available at local and regional level through PPS22 and Regional Planning Guidance.

The exact mix of renewables that will be used to achieve this target will depend on a wide range of factors. As an illustration, this target for 2010 is equivalent to: up to 75 MW of landfill gas fuelled generators, 100 1.5 MW wind turbines (in rural and urban areas) and 27 1MW biomass/biogas powered generators.

A target for heat from renewable sources is proposed of 250 GWh (0.3% of consumption) by 2010 and 650 GWh (1% of consumption) by 2020. The group also proposes production of at least 460 GWh of liquid biofuels for use in the region for transport purposes per year (approximately 44 million litres) by 2010.

Further details of the renewable resources available in the Region, and their likely level of uptake, are given in Annexe E.

4.4 Business Opportunities Targets

There are two areas of activity where targets for business opportunity should be set, as follows:

- The level of investment and uptake of energy efficiency among the businesses of the West Midlands.
- The success of businesses in accessing the market for low carbon (i.e. energy efficiency and renewable energy) products and services.

The first stages towards setting targets in these areas are described below:

4.4.1 Energy Efficiency Take Up

An issue that this Strategy can influence is the availability and take up of energy efficiency advice by businesses. This includes the take up of energy saving advice from the Carbon Trust³³.

In 2003 approximately 2,200 West Midlands organisations called the Action Energy helpline (about 12% of total calls to the helpline) 400 surveys³⁴ were undertaken (about 30 of which were design advice) and around 2,000 days of technical assistance on energy efficiency were provided. It has been estimated that this will lead to annual savings of 16,500 t CO₂. By mid-2004, 210 West Midlands companies had already received surveys. Within the past 12

³² The Government's renewables target is based on the percentage of electricity generated, while the target proposed in this Strategy is based on the percentage of electricity used. This is because the region consumes more electricity than it generates. Using a target based on electricity generation, the region's renewables target of 10% would be 1,010 GWh (Table 2), whereas a target based on 10% of electricity used would be nearly 1,600 GWh (Table 1). If either of the large power stations in the Region closed the target based on generation would instantly decrease.

³³ The Carbon Trust provides free advice on energy efficiency plus interest free loans for related investments to non-domestic or transport energy users. Previously under the name of the Action Energy programme, energy saving advice is now offered under the banner of the Carbon Trust. Help line 0800 585 794.

³⁴ The West Midlands is second only to the South East in terms of the number of surveys carried out.

months, 16 West Midlands companies had received £350k through the Carbon Trust's loan scheme. 25% of all of these interest free loans are from companies based within the West Midlands.

Action Energy also focuses its support on major energy users. It is partnering with eight major companies with headquarters in the West Midlands to assist them to reduce their emissions.

The potential also exists to include information and advice on energy efficiency in mainstream business support advice, such as that provided by Business Links.

Potential initial actions and targets for this could be:

- To more accurately assess the level of implementation (and hence emission savings) of the existing advice provided.
- To increase the number of companies who take up Carbon Trust energy saving advice – for example through promotion by Local Authorities, trade associations and public sector providers of business advice (such as Business Links).
- A periodic company survey measuring energy efficiency related investment.

4.4.2 Regional Success in the Low Carbon Market

As with the take up of energy efficiency advice there are many influences on the success of companies from the region in accessing the growing opportunities in low carbon (energy efficiency and renewables) markets that are beyond the control and direct influence of this Strategy. One indicator of the success of West Midlands companies in accessing the energy efficiency market is the number of companies who have products on the Energy Technology List. This list covers products whose positive contribution to energy savings is recognised by giving the purchaser tax benefits. There are currently 100 West Midlands companies with products on this list.

An area where this Strategy can have a positive effect is in encouraging public sector procurement to favour local suppliers. If the public sector look to maximise the regional content of the low carbon goods and services they purchase this will encourage companies in the region to enter the market.

The following figures give an indication of the potential market size for low carbon goods and services in the West Midlands alone:

- If 50% of the domestic energy efficiency measures listed in Annexe B of this Strategy were implemented this would result in a total expenditure of approximately £1,500 million. Research³⁵ has shown that every £40,000 invested creates one job. This level of expenditure would therefore generate approximately 37,000 jobs.
- If the CHP target of 1,000 MW installed capacity is met this will generate approximately 2,000 jobs in manufacture and installation plus approximately 440 jobs in maintenance³⁶.
- If the Renewables targets are met using the illustrative examples given and employment figures from a recent report³⁷ it would create approximately 1,900 jobs by 2010.

³⁵ Energy Savings Trust

There is clearly a large market beyond the West Midlands, both nationally and internationally. The size and diversity of this market makes the setting of targets based on potential numbers of jobs difficult and open to influence based upon the assumptions that would need to be made. However it is safe to say that there is and will be a large market for low carbon goods and services and this Strategy can have a role in identifying the presence and significance of this market beyond the region and in helping companies to access it.

This Strategy can also influence the support given to companies looking for new markets to diversify into energy and environmental business opportunities. EnviroTrade WM, supported by Advantage West Midlands, provides assistance to develop the businesses operating in the energy and environmental technologies cluster. EnviroTrade WM provides support, advice and direction needed for organisations to succeed and seize key opportunities.

A good example of the approach recommended here is that adopted by the WindSupply West Midlands project described in the box below.

Box 7: Business Opportunities

WindSupply West Midlands

This Advantage West Midlands funded project (operated by the Birmingham-based Midlands Environmental Business Company) aims to encourage the involvement of West Midlands suppliers in the fast growing wind turbine industry.

This project has involved the following stages:

A study into how the wind turbine industry works - including how wind farms and turbines were engineered, manufactured, constructed and operated, their components and existing supply chains. West Midlands suppliers capable and willing to try and enter the market and to match the component specifications and requirements of the mainly German and Danish wind turbines manufacturers were then identified and screened.

Activities supported include visits to buyers events at which the component suppliers can meet the manufacturers they need to sell to and to network with each other to help develop working relationships. Companies are also given assistance to attend international trade fairs to promote their abilities. The project also has a skills and innovation element involving West Midlands Universities in the development of components. The project is seeking to expand its activities across the UK and ultimately into other aspects of renewable energy.

Fuel Cell Expertise at Birmingham University

A number of departments are active in relevant fields and they have one of the longest records in the UK of hydrogen based research. They are also active in European wide projects. Their involvement and expertise include:

- *The materials department focuses on technologies relating to the storage of hydrogen.*
- *High temperature fuel cells: Adelan spin off company. A partner in REALSOFC a €25M project with 26 partners funded through the EU 6th Framework programme, running for 4 years from February 2004.*
- *Generation of hydrogen from biomass.*
- *Improving the efficiency of diesel engines with hydrogen injection.*
- *Social and economic implications of a switch to Hydrogen economy.*
- *Running the UK Fuel Cell Network. This network facilitates national interaction between academia and industry, and represents the UK fuel cell industry in Europe. <http://fuelcellnetwork.bham.ac.uk>*

Adelan Ltd is a small solid oxide fuel cell (SOFC) "spin out" company originating from the materials research developments from Birmingham and Keele Universities. Started in 1996, Adelan has progressively established itself as a leading fuel cell company in the UK, working with global partners. Adelan has designed and patented a range of fuel cell products for portable, stationary and transport applications in the 100W to 15kW market, in co-operation with international clients.

³⁶ Using material developed for the EU on energy employment

³⁷ Renewable Supply Chain Gap Analysis. DTI. January 2004

If companies from the West Midlands are to successfully enter the low carbon market the products they offer need to demonstrate innovation. The ideal source for this innovation is the regional Universities. This desire to improve the links between Universities and business is an issue raised in many other regional strategies³⁸.

There are opportunities for many parts of the economy not just manufacturing industries. For example farmers can diversify into the production of energy crops and the market for professional services, e.g. lawyers, accountants, engineers and consultancy, in energy efficiency and renewables will grow.

Potential initial actions and targets for this could be:

- Ensure guidance to Local Authorities on local procurement includes low carbon products and services.
- Ensure that publicly funded business diversification and creation support recognises the significant opportunities in supply low carbon good and services.
- Ensure that the particularly strong prospects for low carbon technologies are recognised in the strategies relating to innovation and business academic links.
- A periodic company survey measuring sales of energy efficiency and renewables products.

4.5 Skills

The availability of suitably skilled personnel may become an increasingly important issue affecting the growth of new business opportunities. There are already a number of energy related areas where skills shortages are recognised. These include:

- The level of awareness of energy issues among staff involved in both public and private procurement.
- The need for awareness raising and training for public sector staff, particularly for planning officers and council members on renewables, and for building control officers on buildings regulations.
- Gaps in the numbers and skill levels of building related professional and technical staff. As well as there being a lack of suitably qualified individuals some of those already involved could improve their knowledge of the latest energy efficiency and renewable energy techniques.
- Other specific shortages such as skills in electrical engineering required by the regional electricity Distribution Company. To support network investment Central Networks³⁹ are leading a network industry initiative to develop graduate power engineers for the future (IEE Power Academy to be launched 7 June 2004) and are developing further regional proposals to provide the necessary technician and skilled craft resources.

Potential initial actions and targets in this area include:

³⁸ Such as the Regional Innovation Strategy, Economic Strategy and the Framework for Regional Education and Skills.

³⁹ Central Networks (a wholly subsidiary of Powergen UK) includes the two licensed distribution companies previously known as East Midlands Electricity and Midlands Electricity.

- The development of targeted courses and training to meet known skills shortages.
- Career awareness raising amongst 14 to 19 years old – stimulating and rekindling interest in “making things” by focussing on the environmental benefits.

4.6 *Implementation Targets*

Establish a Regional Energy Office under the direction of the Regional Assembly and an Energy Advisory Group by April 2005.

Formulate a detailed ‘Phase 2’ action plan by October 2005.

5. Implementation Framework - How, Who and When?

In order to ensure effective delivery of our objectives, a two-phase action-planning process will be necessary. Phase 1 is set out below and identifies the early actions regional partners can take. However, we recognise that a broad range of regional, sub-regional and local partners across sectors will need to be involved in the more detailed delivery of the Strategy's objectives. Therefore we propose a Phase 2, where regional organisations will engage this range of partners in more detailed action-planning and assignment of actions and responsibilities.

5.1 Table of Actions

The table below shows a number of policy actions against the key issues identified in section 2.

For each action the bodies with lead responsibility for implementation is given along with a first milestone for action and some explanatory comments.

Table 5: Implementation Framework

Priority and Policy action	Lead responsibility	First Milestone	Comments
1. Improving Energy Efficiency			
1.1 Encourage energy efficiency across all sectors	The most effective way of reducing emissions from energy is to use less. Energy efficiency also brings financial benefits.		
Negotiate 'commitment agreements' with owners of related strategies to identify their fair share of the relevant target(s): Industry Commercial, public sector Domestic Transport	Energy Advisory Group and Regional Energy Office Climate Change Agreements plus Emissions trading - Trade Associations plus Carbon Trust West Midlands Business Council ⁴⁰ Regional planning guidance, Landlords, local Authorities Housing Strategy, Private Housing developers, Housing Associations, Housing renewal areas, Local Authorities, Energy Efficiency Advice Centres (EEACs) Local Authorities, public transport operators, Centro, Advantage West Midlands, adopt a co-ordinated approach - led by the Transport Champion	Winter 2005	Opportunities to cascade downwards into expenditure programmes and onwards into projects and strategies. Maximise implementation of existing nationally led programmes. Energy service companies (ESCOs) may have a role to play in facilitating uptake of energy efficiency measures.

⁴⁰ See Annexe C for a full list of members of the West Midlands Business Council

1.2 Improve regional support and delivery of national programmes	Support the activities of the Carbon Trust and Energy Savings Trust Utilise existing resources and programmes - develop specific regional activities that focus on the priorities identified.		
Specific advice programmes for: Small and medium sized enterprises Specific groups and areas of households Local Authorities – energy efficient vehicle joint procurement, travel plans, affordable warmth strategies, difficult infrastructure decisions.	Regional Energy Office Energy Advisory Group Carbon Trust Energy Savings Trust Local Authorities Regional Housing Partnership Sustainable Housing Partnership		Review effectiveness of existing delivery and if this is appropriate then support extension if not then provide the money direct to the region. Extend Carbon Trust Carbon Management programme to all Local Authorities in the region.
1.3 Reducing the use of energy in buildings offers major potential	Improve the energy efficiency of new build and refurbishments.		
Continue the development of a Regional Design Framework (covering buildings that they fund or part fund) by AWM, that includes targets for energy and uptake of renewables	Advantage West Midlands / Government Office West Midlands Local Authorities	Spring 2005	For example promote natural ventilation and high standards of insulation. Linked to planning. Raise awareness of the need to minimise embedded energy in construction, and opportunities from e.g. use of wood in building, products for listed buildings, refurbishment rather than demolition, etc. Less new build in rural areas so concentrate on existing housing stock and (new) single building solutions.
Identify opportunities for the Energy Action Areas concept (as suggested in the London Energy Strategy)	Regional Energy Office Advantage West Midlands / Government Office West Midlands Local Authorities	Summer 2005	These geographical areas would act as a showcase, demonstrating a range of energy technologies and techniques, and providing a way to target resources and illustrate what is possible.
2. Increasing the use of Renewable Energy Resources			
Promoting the deployment of mature and near market technologies in the region: wind, larger run of river hydro, biomass (energy crops), biogas	Regional Energy Office Regional Assembly Local Authorities Marches Energy Agency Energy Savings Trust Energy Industry Renewable Energy Advisory Service		These resources are available and offer the most attractive returns. PPS22 and RPG11 state that local authorities should encourage renewables proposals in their Development Plans Recognise potential implications on bio-diversity & landscape.

Promoting the deployment of renewables in areas off the gas grid (solar thermal, heat pumps, biomass heating).	Regional Energy office Local Authorities Marches Energy Agency Community Renewables Initiative Wood energy networks (Marches, Stafford) Renewable Energy Advisory Service		No mains gas means that the competing fossil fuel heat sources are generally high cost. Promote exemplar projects and encourage public sector to lead by example.
Promoting domestic renewable energy (PV, wind etc).	Regional Energy Office Regional Housing Board Local Authorities Marches Energy Agency Renewable Energy Advice Service Community Renewables Initiative		There are good opportunities for integrating renewables into housing. There are grants available – the Clear Skies scheme.
Agree a target of achieving at least a 1.5% CO ₂ emission reduction through the use of biodiesel by 2020. Promoting the use of / demand for, production and processing of biodiesel and other biofuels - such as bioethanol (sugar beet, apples)	Energy Advisory Group Local authorities, Marches Energy Agency Private sector e.g. British Sugar (bioethanol) Oldbury biodiesel facility (BIP) National Farmers Union Defra Government Office West Midlands		Based on the fuel mix allowed through the current tax regime. There is a current consultation (from Defra) on implementing the biofuels directive. Opportunities for using canals?
3. Maximising Uptake of Business Opportunities			
3.1 Develop the West Midlands as a leading supplier of low carbon goods and services	The scale of the changes required to the way energy is produced, distributed and consumed will create a number of business opportunities.		
Promotion of business opportunities Raising awareness of the business benefits from energy efficiency	West Midlands Business Council Business Link Manufacturing Advisory Service Regional Energy Office Advantage West Midlands Carbon Trust		The Strategy and implementation plan needs to continue to support 'more of the same' actions within businesses in the region. Link with other initiatives e.g. Rural Hubs, Market Towns initiative.
Using supply chain pressure and green procurement to help to increase awareness and uptake of energy efficient products and processes	Regional Energy office		The public sector can lead by example.
Diversification opportunities: exploiting emerging markets for new technologies and processes Renewables Building technologies Micro generation Electrical engineering	Advantage West Midlands West Midlands Business Council Business Link Regional Energy Office Manufacturing Advisory Service		Including links with waste/recycling, e.g. composting/biogas.

Providing components for a wide range of new energy products	Advantage West Midlands West Midlands Business Council Business Link Manufacturing Advisory Service Regional Energy Office		Opportunities for existing companies to diversify to provide components for low carbon products.
Building on the innovative capabilities in the region	Universities Advantage West Midlands West Midlands Business Council Business Link Manufacturing Advisory Service Regional Energy Office		Universities need to be at the forefront of innovative developments, working with businesses to provide appropriate innovation support, and providing appropriately skilled graduates to enter the industry. New R&D areas identified include the emerging tidal and wave power, and fuel cells/hydrogen. Demonstration projects to promote business opportunities.
3.2 Skills development	Support is required in developing the skills required for the installation and manufacture of energy efficiency and renewable energy technologies and the maintenance of the energy distribution infrastructure.		
Lead on the issue of skills for the energy sector (both renewable resources and conventional), produce an action plan for alleviating skills shortages in the application of energy efficiency and generation.	Further and higher education sector Learning and Skills Councils Sector Skills Councils West Midlands Business Council Central Networks, National Grid Transco	Autumn 2004	Birmingham University's new Institute for Energy Research and Policy will exploit Birmingham's existing world class research in energy production, supply and policy. Community skills development to encourage bottom-up approaches.
4. Ensuring Focused and Integrated Delivery and Implementation			
4.1 Leadership, organisation, communication and attraction of funding	Create an Energy Advisory Group, Regional Energy Office and Regional Energy Champion(s)		
Set up an Energy Advisory Group under the control of the Regional Assembly	Regional Assembly	Winter 2004	To reflect the importance of this issue this Energy Advisory Group should not be a subset of another policy group.
Secure funding for Regional Energy Office	Government Office West Midlands/ Advantage West Midlands/ West Midlands Regional Assembly	Winter 2004	It is vital that the office has adequate and long term funding.
Establish a Regional Energy Office (REO) with a formal role in the policy process under the direction of the Energy Advisory Group.	The exact nature of the REO will be reached following a consultation exercise. Consultation facilitated by: West Midlands Regional Assembly Government Office West Midlands Advantage West Midlands	Winter 2004	To co-ordinate and potentially rationalise the existing activity, strengthen networking and providing a focal point for the implementation of this Strategy.

The Regional Energy Office should appoint an 'Energy Champion'	West Midlands Regional Assembly Energy Advisory Group Regional Energy Office	Spring 2005	To carry out promotion, dissemination and awareness raising activity. Including community involvement.
Provide focus for passing regional opinions and priorities on energy issues to Government and regulators (Ofgem and Energy Watch).	Regional Energy Office / Government Office West Midlands / Advantage West Midlands / West Midlands Regional Assembly Energy Industry	Winter 2004 Onwards	
Work with Energy Savings Trust, Carbon Trust and Local Authorities on promotional campaigns and regionally bespoke awareness raising. Including energy efficiency, transport, renewables.	Regional Energy Office, Energy Savings Trust, Carbon Trust Local Authorities Renewable Energy Advice Service Community Renewables Initiative	Winter 2004 Onwards	
Integrate funding in support of domestic energy efficiency - Improve the co-ordination between and management of the existing funding sources. Establish a regional board involving energy efficiency advice centres (Energy savings Trust), energy suppliers, Warm Front Grant agencies and other sustainable energy organisations.	Energy Savings Trust Energy Advisory Group Energy Suppliers (e.g. Npower, British Gas, Powergen) Local Authorities Housing Advisory Group	Summer 2005	
Establish a forum of organisations capable of contributing to eradication of fuel poverty.	Energy Advisory Group Energy Savings Trust Local Authorities Health Authorities	Winter2005	
4.2 Policy co-ordination	Planning policy is one of the major policy levers which regional organisations have at their disposal.		
Ensure local development frameworks recognise and reflect the benefits of: <ul style="list-style-type: none"> • Security of supply issues • Community heating and CHP • Buildings integration of renewables • Actions to address climate change mitigation measures 	Government Office West Midlands West Midlands Local Government Association West Midlands Regional Assembly Local Authorities Countryside Agency		Other LA powers such as Well Being, LA invest to save are relevant. Plus non-statutory planning activities such as the Market Towns Initiative. Regionally cohesive planning policies and decision making, e.g. RPG.

Raise awareness amongst Local Strategic Partnerships of energy issues to ensure that Community Strategies take account of energy issues.	Regional Planning Body Government Office West Midlands / West Midlands Local Government Association / West Midlands Regional Assembly/ local Authorities Regional Energy Office Carbon Trust Energy Savings Trust	Spring 2005	Local Development Frameworks (LDFs) are the principal means through which planning policies are implemented. They are influenced through Community Strategies and the Regional Spatial Strategy. Importance of linkages to Market Towns.
Encourage energy efficiency and renewable energy measures when applications are referred to them for comment.	Regional Planning Body Government Office West Midlands / West Midlands Local Government Association / West Midlands Regional Assembly/ Local Authorities Advantage West Midlands	Spring 2005	The forthcoming Planning Bill ⁴¹ will strengthen the role of the regions in the planning process. Advantage West Midlands also has statutory consultation rights for strategic planning applications. Both give opportunities to ensure regional energy strategy objectives are expressed
4.3 Transport policy links	The emission goals of this Strategy should be incorporated into the transport strategies.		
Apply and implement the recommendations on modal shift, behavioural change and economic instruments from the multi-modal study to the region as a whole, with focus on achieving high contribution from urban areas	Energy Advisory Group Regional Transport Partnership Government Office West Midlands		The recommendations of the multi modal study refer to the Birmingham conurbation only. Behavioural - 5% less car trips by 2010, 10% by 2031. Economic - road user charges. Modal - improved road, bus and rail infrastructure and public transport priority. Recognise significant differences in rural areas. Car sharing opportunities for both urban and rural areas. Promote teleworking - links with ICT developments.
Prioritise public transport schemes in all major urban areas	Regional Assembly Local Authorities Centro Regional Transport Partnership		The availability of public transport is key to encouraging modal shift.

⁴¹ Green Paper - Planning Policy Statement (PPS) 1: Creating Sustainable Communities. Office of the Deputy Prime Minister

4.4 Region specific data is needed to develop and review the Energy Strategy	Develop a region-wide monitoring and evaluation framework for the strategy		
Develop a plan for recording and benchmarking the use of energy in the region to be reported on an annual basis, beginning with gas and electricity consumption on a postcode basis as a priority, with other fuels and transport later.	West Midlands Regional Observatory Government Office West Midlands DTI DfT Local authorities NHS estates Utilities, DTI	Spring 2005	Moving away from using notional averages and using actual regional-specific data. More accurate data on resource availability for renewables. Electricity and gas use ideally to 5 or 6 digit post code level.

5.2 Risk Assessment

There are a number of issues that could potentially hinder the uptake of this Strategy. In order that these issues can be addressed they have been listed along with the way in which they will be countered.

When specific actions are defined at Phase 2 of the strategy implementation an action-specific risk analysis including an analysis and potential ranking by cost effectiveness in terms of CO₂ saved for money spent can be carried out:

Table 6: Risks to the Strategy and Ways to Tackle These

Risk	Ways to Counter
Lack of funding	<p>It is anticipated that the DTI will seek to provide a significant contribution to the costs of the Regional Energy Office.</p> <p>The Strategy aims to influence adjust the priorities on existing energy funding to match those of this Strategy.</p> <p>It is hoped that influencing the spending of other programmes and strategies with the ability to reduce energy use and promote renewables will mean that in part existing budgets are used to achieve the aims of this Strategy.</p> <p>Local authorities may encounter barriers through insufficient staff or staff time to deliver. Additional resources could be directed to e.g. enforcement of building regulations and to developing a strategic overview of energy and planning issues.</p> <p>Maximise share of national and international funding which is available – e.g. energy suppliers – energy efficiency commitment funding, Carbon Trust, Energy Savings trust. EU - Intelligent Energy Europe programme (ALTENER - renewables, SAVE - energy efficiency, STEER - transport) and Framework funds for R&D.</p>
Lack of political ownership and leadership	<p>Ensure that the Strategy is owned, supported and meaningfully resourced by the key regional organisations: West Midlands Regional Assembly / Advantage West Midlands / Government Office West Midlands.</p> <p>The creation of the Energy Advisory Group and Regional Energy Office is intended to provide a focus for delivery and leadership.</p> <p>Planning authorities have a role to play in encouraging renewables.</p>

Poor take up of schemes	Awareness raising, promotion and dissemination of this Strategy and its actions is key. The adoption of a share of targets by other Strategies and programmes should help promote take up of schemes. Encourage local authorities to lead by example through procurement, e.g. establishing purchasing clubs.
Lack of clarity on roles	The Regional Energy Office will provide a central focus for the Strategy. The leadership of the key regional organisations is key.
Not meeting national targets - including existing reductions predictions.	By allocating a share of regional targets to existing strategies, programmes etc. the chances of meeting the targets should be improved.
Variations in how LAs enforce building regulations	The Strategy aims to provide guidance to Local Authorities to ensure that they all work to the highest standards.
Sector specific risks	The sector under the most pressure is transport. Therefore the Strategy needs to do what it can to ensure that meaningful action is taken to achieve the Regional Transport Priorities.
Lack of data	Lobby for extension of regional data provision from DTI. Task Regional Observatory with data collation and review.

While the above risks to the Strategy are all real it is important to bear in mind that there are many risks involved if the Strategy fails. These include:

Table 7: Risks if the Strategy fails to Deliver

Risk	Implication
Climate change not addressed	This has potential direct implications for the region such as an increase in the risk of winter flooding. On a wider scale the potentially more severe impacts on the World as a whole will have knock on impacts on the region.
Loss of competitiveness	Other regions respond in a more positive way.
Failure to secure share of funding	Job creation and retained benefit to the West Midlands (gains in income through improved energy efficiency) are lost.
Poor image	Failure to act gives a negative image for the region – putting off potential investors, tourists and those that wish to make the West Midlands their home.

Annexe A: Baseline Emissions

The choice between preparing a bottom-up emissions inventory of all greenhouse gases and the method used was discussed by the Steering group and at the working group meetings. It was agreed to produce a simple estimate of final energy consumption which only covered energy CO₂. This uses the final consumption section of the UK Digest of Energy Statistics Table 1.1 (aggregate energy balance) and applies West Midlands fractions to each sector, i.e. % of national employment which is in the West Midlands in each of the industrial sectors and public sector, % of population for domestic energy use, regional fuel delivery estimate for road fuel, % of passenger km in the West Midlands for rail.

Air transport and distribution losses were excluded. For air transport, the view was that at this stage it would be better to focus on sectors which could be better influenced at the regional level. (Also see section 3.1.) Distribution losses were excluded on the grounds of simplicity. Nationally they account for approximately 2% of final energy consumption. Using the national percentage would be easiest but this does not reflect the source of electricity used in the region nor its position in the national gas network.

The emissions factors used were from Defra:

(<http://www.defra.gov.uk/environment/envrp/gas/05.htm>)

The West Midlands' share of national emissions and energy use compares the regionalised figures to the national figures calculated on the same basis.

There are compromises in using this method, but it was selected mainly because of its simplicity and because it is hoped that in the future there will be national guidelines produced on regional energy data reporting. Better regional data on gas and electricity use will become available within the next few years. A recent DTI consultation on this has just concluded, see http://www.dti.gov.uk/energy/inform/regional_energy/index.shtml. If national guidelines are produced which recommend a different method for estimating regional energy use this Strategy will need to be updated to reflect the new method.

Preparing a regional greenhouse gas emissions inventory would need to make many of the same assumptions - e.g. domestic and small industrial/service sector gas and oil use, road fuel delivery. The biggest point sources in the West Midlands would be the power stations at Ironbridge and Rugeley. As their output and emissions vary depending mainly on the wholesale electricity market and coal price relative to gas and not West Midlands energy demand this would not reflect West Midlands' energy use. Calculating the origin of the non-regionally produced electricity used in the region would need to be done on an hourly basis and would be complex. It was also felt that influencing non energy sources of GHG emissions was not the purpose of this strategy.

The following table show a breakdown of energy use by sector and source.

Table 8: West Midlands Final Energy Consumption Estimate 2002 (GWh)

	Coal and solid fuel	Petroleum products	Natural gas	Renewables and waste	Electricity	Total (GWh)	Total (Kt CO ₂)
Industry	3,816	8,961	20,555	227	14,018	47,578	13,229
Commerce, public sector	46	1,812	8,597	189	8,280	18,925	5,643
Domestic	1,939	3,876	34,695	261	10,559	51,330	12,644
Transport	-	42,047	-	-	108	42,154	10,138
Total (GWh)	5,801	56,695	63,848	678	32,966	159,987	
Total (Kt CO₂)	1,740	13,607	12,131		14,175		41,653

Source: DUKES, NOMIS, Mike Ward Associates, Inverewe Consulting, WM Multi Modal Study

DTI produced data on regional gas and electricity use are available⁴². The DTI figures show consumption of 68,365 GWh for gas and 32,029 GWh for electricity. There are a number of reasons for the differences between the DTI figures and our estimates. The DTI figures have not been used due to the lack of a sectoral breakdown and the lack of availability of oil and solid fuel data on the same basis.

The table below shows the overall predictions by sector.

Table 9: Sectoral Baseline Predictions Including Impact of all Known Policies (kt of CO₂)

	1990	2000	2002	2010	2020	2030	2040	2050
Industry	13,787	13,822	13,229	10,858	9,496	8,134	7,066	5,997
Services	6,340	6,151	5,643	3,610	4,934	6,259	6,744	7,230
Domestic	14,301	13,236	12,644	10,277	10,576	10,875	10,493	10,110
Transport	9,923	10,158	10,138	10,138	10,138	10,138	10,138	10,138
Total	44,351	43,367	41,653	34,882	35,144	35,406	34,441	33,475
Target - Straight line reduction (of 60% by 2050)				38,163	32,959	27,755	22,551	17,347

These projections are based on those in the White Paper⁴³ with the exception of those relating to transport (adjusted in the light of the exclusion of aviation and the latest projections from the Department for Transport) and the most up to date⁴⁴ projections on combined Industrial and Services energy use (3.7% lower by 2010 mainly as a result of European Emissions Trading) and domestic energy use (8% lower by 2010 due to an extended Energy Efficiency Commitment, CHP and building regulations).

It is important to realise that national policies already in place are predicted to deliver savings sufficient to put the region beyond the straight line target by 2010. The region has an important role to play in ensuring that these predicted savings (and ideally more savings) occur.

⁴² Energy Trends: http://www.dti.gov.uk/energy/inform/energy_trends/2003/dec_03.pdf

⁴³ The National figures used as the base are from 'Long Term reductions in greenhouse gas emissions in the UK' IAG report, February 2002. (<http://www.dti.gov.uk/energy/greenhousegas/index.shtm>)

⁴⁴ Energy Efficiency: The Government's Plan for Action. April 2004. The DTI are in the process of producing a document to update Energy Paper 68. The projections and targets in this Strategy will need to be updated and refined as more accurate data becomes available.

Industrial Baseline Emissions

Industrial energy use emissions are expected to decrease by 2020. This is partly as a result of natural improvements (historically, energy efficiency improvement in industry and services is 1% a year) and predicted restructuring. Existing policies such as Climate Change Agreements, Enhanced Capital Allowances and Emissions Trading are also expected to reduce emissions.

The Government's plan for Action on Energy Efficiency⁴⁵ states that by 2010 activities driven by the Climate Change Programme⁴⁶ will reduce emissions in industry, commerce and the public sector by 7.9 Mt of carbon (29 Mt of CO₂). The approximate share of this which should occur in the West Midlands is 2.5 Mt of CO₂.

Commerce and Public Sector Baseline Emissions

The rapid growth that is expected to occur in this sector along with the lack of existing central government policies specifically targeted on reducing its energy consumption mean that the sectoral emissions are predicted to only decrease slightly by 2020.

Domestic Sector Baseline Emissions

Domestic energy related emissions are predicted to decrease. This overall decrease is the predicted net result of the following factors:

- A decrease resulting from natural improvements in energy efficiency which occur over time through factors such as new houses replacing old and boilers and appliances being replaced.
- An increase in demand caused by a growth in levels of comfort, rise in home entertainment and increasing number of households.
- Existing policy measures (Energy Efficiency commitment⁴⁷, HECA⁴⁸ etc.) which should reduce emissions. The Government's plan for Action on Energy Efficiency states that by 2010 these activities plus others⁴⁹ will reduce emissions in the domestic sector by 15 Mt of CO₂ the approximate share of this which should occur in the West Midlands is 1.4 Mt of CO₂.

Transport Baseline Emissions

For road transport, the estimated energy use (derived from national figures) will show a very slight decrease. In order to achieve substantial savings, national and regional measures will need to be vigorously promoted and implemented.

⁴⁵ Energy Efficiency: The Government's Plan for Action. DEFRA. April 2004.

⁴⁶ Climate Change Agreements, Emissions trading, Building regulations upgrades (2002 and 2005) and Carbon Trust activities.

⁴⁷ The Energy Efficiency Commitment is an obligation on energy suppliers to fund domestic energy efficiency measures – normally done in the form of grant aid to consumers.

⁴⁸ Home Energy Conservation Act – an obligation on Local Authorities to report on domestic energy efficiency and act to improve their own housing stock.

⁴⁹ Building Regulations improvements in 2005, domestic CHP and Decent Homes

Annexe B: Example Sectoral Energy Efficiency Measures

Industrial Energy Efficiency Measures

Individual energy saving technologies are harder to list for industrial processes than for households since there are hundreds of different types of process opportunities. However there are a number of cross sectoral technologies such as high efficiency motors, variable speed drives, CHP and buildings services savings (of the same nature as the commerce and public sector measures described in the next section) which offer substantial saving potentials.

Table 10: Industrial Energy Efficiency Measures

	Saving / installation		WM Potential	WM kt CO ₂ potential
	kWh/yr	t CO ₂ /yr		
High efficiency motors ⁽¹⁾	1,000	0.4	45,000 ⁽⁴⁾	20
Variable speed drives ⁽²⁾	4,160	1.8	10,000 ⁽⁵⁾	18
CHP ⁽³⁾		1,300	1,200 ⁽⁶⁾	1,560
Building services reductions ⁽⁷⁾				707
TOTAL				2,305

(1) Based on a 5% improvement on a 10 kW motor operating 9am to 5pm 5 days a week

(2) Match the output from a motor to the load on it - based on a 10% improvement on a 20kW motor operating 9am to 5pm 5 days a week (savings are highly installation specific)

(3) Based on a typical industrial 1MWe CHP.

(4,5) 4 - The approximate number of industrial sites in the region (National Statistics), 5 - 25% of (4)

(6) 5 % of the industrial customers in the Central Networks West (old MEB) region.

(7) As per the commerce and public sector measures - based on the assumption that energy use in this sector (on a kWh/m² basis) is half that of the commerce and public sector and the % savings potential is the same.

Commerce and Public Sector Energy Efficiency Measures

The following table lists a series of measures with the regional potential based on the proportion of national Commerce and public sector employment that is based in the region.

Table 11: Commerce and Public Sector Energy Efficiency Measures

	WM Annual Saving kt CO ₂
Fit fixed period timers on stairwell lights	202
Compact fluorescent lamps replace tungsten bulbs	162
Turn off lights when not in use	153
Thermostats down by 1°C	253
Energy management of office equipment	125
Replace 38mm fluorescent tubes with 16mm	96
Install energy efficient air conditioning	72
Replace 26mm fluorescent tubes with 16mm	67
Install most energy efficient boiler	180
Fit thermostatic radiator valves on all radiators	164
Fit basic timers on lighting	51
Total	1,525

Source: Energy its Impact on the Environment and Society. DTI

Domestic Energy Efficiency Measures

There are substantial savings available. Existing policies are expected to lead to some of these measures being taken up - the challenge is to increase this take up and add to it through measures such as community heating, renewables and micro-CHP.

Table 12: Domestic Energy Efficiency Measures

	Saving / dwelling		,000 WM dwellings	WM kt CO ₂ potential
	kWh/yr	kg CO ₂ /yr		
Loft insulation (currently below standard)	1,011	257	1,700	437
Cavity wall insulation	4,239	1077	783	843
Solid wall insulation	3,675	934	955	892
Double glazing (currently none)	1,847	469	661	310
Draught proofing (currently none)	486	124	1,516	187
Hot water cylinder insulation (currently below standard)	676	131	452	59
Condensing boilers	4,569	887	1,408	1,248
Improved boiler controls	1,672	324	226	73
Energy efficient lighting	272	250	2,178	543
Energy efficient appliances	133	122	15,167	1,853
Total				6,447

Source: Adapted from BRE⁵⁰

The number of WM dwellings is based on 9.8% of the national estimate. WM-specific data would enable more accurate targeting, but overall values are unlikely to be very different to the existing estimates.

Transport Energy Efficiency Measures

The Transport working group has prepared the following list of activities with an estimate of their potential total savings. These savings are all currently available. The level and speed of take up will depend upon the political will and funding that is available.

- Powertrain improvements⁵¹ - more energy efficient vehicles.
- Multi-modal (integrated transport) recommendations - a number of the policies in the multi-modal study are designed to encourage a shift away from cars in the conurbation, these should be expanded to cover the whole region.
- Driver behaviour and travel habits - Driving style has a significant impact on vehicle fuel efficiency. Encourage a switch for short journeys from car to foot or bicycle. Car pools. Park and ride.
- Commercial vehicles and drivers - Driver behaviour, delivery methods.
- Public sector initiatives - Specify efficient vehicles, encourage car sharing, develop travel plans.

⁵⁰ Carbon Emission Reductions from Energy Efficiency improvements to the UK Housing Stock. BRE 2001.

⁵¹ Powertrain covers engine efficiency. This has been improved at 1% per annum over the last 15 years and is predicted to continue. The ultimate goal for small cars will be the '3 litre vehicle', i.e. a car that uses no more than 3 litres of fuel for every 100 km travelled.

- Biofuels - Encourage take up, plus development of a complete supply chain.
- Alternative fuel vehicles - The savings are highly sensitive to the fuel source and vehicle characteristics.

Table 13: Transport Energy Efficiency Measures

Initiative	Estimated Saving %	West Midlands savings kt CO₂
Powertrain Improvements	8.4	852
Multi-Modal Recommendations	9.0	912
Driver Behaviour and Travel Habits	2.5	253
Commercial Vehicles and Drivers	2.0	203
Public Sector Initiatives	3.0	304
Biofuels	1.5	152
Alternative Fuel Vehicles (Fuel Cell, Hybrids etc.)	Indeterminate	
Total		2,676

Annexe C: Glossary of Terms

Added Value

See "Value Added"

Advantage West Midlands (AWM)

Regional Development Agency for the West Midlands. www.advantagewm.co.uk

Carbon Trust

Provides advice and funding for non domestic energy users. Helps business and the public sector cut carbon emissions and capture the commercial potential of low carbon technologies.

Web: www.thecarbontrust.co.uk

Central Networks

Central Networks (a wholly subsidiary of Powergen UK) includes the two licensed distribution companies previously known as East Midlands Electricity and Midlands Electricity.

Clear Skies

Grant scheme to part fund domestic renewables. Clear Skies is funded by DTI and managed by BRE. www.clear-skies.org

Climate Change Agreement (CCA)

Climate Change Agreements provide an 80% discount from the CCL and are made with those energy intensive industry sectors that agree challenging targets for improving their energy efficiency or reducing carbon emissions.

Climate Change Levy (CCL)

The aim of the CCL is to encourage improvements in energy efficiency and reduce emissions of greenhouse gases. The CCL is a tax on the use of energy in industry, commerce and the public sector, with offsetting cuts in employers' National Insurance Contributions and additional support for energy efficiency schemes and renewable sources of energy.

Combined Heat and Power (CHP)

A combined heat and power (also referred to as a cogeneration or a CHP) unit is an installation in which heat energy released from fuel is transmitted to electrical generator sets which are designed and operated in such a way that energy is partly used for generating electrical energy and partly for supplying heat for various purposes. The thermal efficiency of a combined heat and power unit is significantly higher than that of an electricity-only unit.

Community (or District) Heating

Uses one central source of heat to supply to multiple buildings, be they homes, schools, hospitals or offices.

Community Renewables Initiative

Support scheme funded by Countryside Agency. Part of the region covered by Marches Energy Agency www.countryside.gov.uk/communityrenewables

Department for Environment, Food and Rural Affairs (DEFRA)

Responsible for Energy efficiency including CCAs. Have strategies for tackling fuel poverty, and have developed a home energy efficiency scheme. Provides general information for companies who are eligible to enter into Climate Change Agreements. www.defra.gov.uk

Department for Transport (DfT)

Responsible for the Transport strategy and policy. www.dft.gov.uk

Department of Trade and Industry (DTI)

The Department of Trade and Industry's Energy Group deals with a wide range of energy related matters, from its production or generation to its eventual supply to the customer.
www.dti.gov.uk

Energy Efficiency Advice Centres (EEACs)

Independent advice centres operating on behalf of the Energy Savings Trust, providing free, impartial and independent advice and information to households. Four EEACs cover the entire West Midlands region and operate with funding from the Energy Savings Trust, local authorities and the private sector.

Energy Intensity

Energy intensity gives an indication of the effectiveness with which energy is being used to produce added value.

Energy Service Company (ESCO)

A professional company that provides energy end users with energy management services.

Energy Savings Trust

Provide advice and funding for domestic energy users plus transport. www.est.org.uk

Energy Watch

Independent watchdog for gas and electricity consumers. Provides free, impartial advice on a range of energy issues. www.energywatch.org.uk

Final Energy Consumption

Final energy consumption is the energy consumed in the transport, industrial, commercial/public authority and domestic sectors. It excludes deliveries to the energy transformation sector and to the energy producing industries themselves.

Fuel Poverty

Households for whom energy costs represent 10% or more of their income.

Greenhouse Gases

The main greenhouse gas emissions considered in this Strategy is carbon dioxide (CO₂). Emissions of these gases are associated with the "Greenhouse Effect" which gives rise to an increase in the Earth's temperature. Some publications use tonnes of carbon as opposed to tonnes of carbon dioxide. In order to convert between them the difference between the atomic weights of carbon dioxide and carbon molecules are used, i.e. 1 t of C = 44/12 t of CO₂.

Government Office for the West Midlands (GOWM)

Work with regional partners and local people to maximise competitiveness and prosperity in the West Midlands, and to support integrated government policies for an inclusive society.

Web: www.go-wm.gov.uk

Gross Value Added (GVA)

Gross Value Added measures the contribution to the economy of each individual producer, industry or sector in the United Kingdom. GVA is used in the estimation of Gross Domestic Product, which is a key indicator of the state of the whole economy.

Learning and Skills Council (LSC)

Responsible for funding and planning education and training for over 16-year-olds in England.

Web: www.lsc.gov.uk. Not responsible for higher education (universities) funding.

Local Authority Support Programme (LASP)

Operated by the Central Midlands EEAC and the Warwickshire and Worcestershire EEAC, this service is funded by the Energy Savings Trust and offers strategic support to 22 local authorities in the region on matters relating to sustainable energy use (energy efficiency and renewable energy).

Mt

Mega tonne, million tonnes

MWe

Megawatt electrical. CHP output is defined in terms of both electrical and heat output.

National Grid Transco

Merged company covering gas distribution – Transco and Electricity transmission (between power stations and regional distribution companies). www.nationalgrid.com/uk/

ODPM - Office of the Deputy Prime Minister

Responsible for policy on housing, planning, and regional and local government.

www.odpm.gov.uk

Ofgem - Office for Gas and Electricity Markets

The regulator for Britain's gas and electricity industries. Its work focuses on making gas and electricity markets work effectively, regulating monopoly businesses intelligently, securing Britain's gas and electricity supplies, and meeting its increased social and environmental responsibilities.

Renewable Energy

Renewable energy includes hydroelectricity, biomass, wind, and solar, tidal and geothermal energies.

Renewable Energy Advice Service (REAS)

Operated by the Black Country EEAC on behalf of the Energy Savings Trust. The service offers renewable energy advice and information to households, RSLs, local authorities and community organisations in the Birmingham and Black Country conurbation areas.

Renewables Obligation (RO)

An obligation on all electricity suppliers to supply a specific proportion of electricity from eligible renewable sources.

SAP

The Standard Assessment Procedure. Calculation of a dwelling's energy use. SAP ratings are scored on a scale from 1 to 120 where 1 is the worst and 120 the best.

Sector Skills Councils (SSCs)

Sector Skills Councils are independent, UK wide organisations developed to tackle the skills and productivity needs of individual sectors throughout the UK. They are organised by groups of influential employers in industry or business sectors of economic or strategic significance. Cogent is the SSC for the Oil and Gas Extraction, Chemicals Manufacturing and Petroleum Industries. There is also an SSC specialising in energy and utility skills.

<http://www.euskills.co.uk/>

Value Added

The value added (to a product, or added value of a product) is the increase in the value of that product as the result of a particular stage of a production process.

Watt and Watthour

The standard unit of energy is the joule. It is equal to the energy dissipated by an electrical current of 1 ampere driven by 1 volt for 1 second.

One watt amounts to 1 joule per second. Electrical appliances are rated in watts and this describes their instantaneous load, or in the case of electricity generators their output, e.g. a 100 watt light bulb, or a 2 kW kettle.

In common with all units large amounts of watts are described as follows:

1 kW = 1,000 W 1MW = 1,000,000 W 1 GW = 1,000,000,000 W

In order to describe energy consumption, or generation the watthour unit is used.

1 watthour is the continuous load/output of 1 watt for 1 hour

As with watts multiples of the units are described as follows:

1 kWh = 1,000 watts for 1 hour, also MWh and GWh

Gas and electricity bills describe the number of kWh consumed and the prices are given in pence per kWh.

To put this in context 200 people consume about 1 GWh of electricity a year.

West Midlands Business Council

Membership: Asian Business Forum, Association of Colleges, Business in the Community, Chartered Institute of Building, Confederation of West Midlands Chamber of Commerce, Country Land and Business Association, Engineering Employers' Federation, Federation of Small Businesses, Heart of England Tourism, Institute of Chartered Accountants in England and Wales, Institute of Chartered Secretaries and Administrators, Institute of Directors, National Farmers Union, National Federation of Retail Newsagents, Royal Institution of Chartered Surveyors, West Midlands Co-operative and Mutual Council Ltd, West Midlands Higher Education Association, West Midlands IT Association, West Midlands Learning and Skills Councils.

West Midlands Local Government Association (WMLGA)

A voluntary association of the 38 local authorities (County, District, Metropolitan and Unitary) in the West Midlands region. Web: www.wmlga.gov.uk

West Midlands Regional Assembly (WMRA)

Work with a range of social and economic partners, forming strategic partnerships to develop policies and strategies that address the issues that affect the region. www.wmra.gov.uk

Annexe D: Other Strategies of Relevance

Strategy	Key areas related to energy
Regional Planning Guidance (RPG)	Published June 2004. Long term spatial strategy to guide the development of the West Midlands region over the next 20 years. Takes a pro-active approach to planning for renewables and energy conservation.
Regional Spatial Strategy	A new approach to guide the future pattern of development across the Region. RPG will be given statutory status as the Regional Spatial Strategy - RSS. The RSS sets out an overarching spatial strategy for the Region providing an important means by which other regional policies and proposals can be better 'joined up' and integrated. Greater emphasis on the creation of high quality built and natural environments, including energy efficiency, renewables, transport.
Local Development Framework	Implementation of the RPG and RSS. Changing the existing structure of development plans and adopting a local development framework. Opportunities for stakeholders to engage more easily and effectively.
Regional Economic Strategy (RES)	Energy production and use is integral to the Region's economy. The RES identifies and works to address issues limiting the economic growth of the Region, including transport infrastructure, housing availability, quality employment opportunities.
Framework for Regional Employment Skills Action Plan (FRESA)	To encourage a robust and vibrant economy by developing a highly and appropriately skilled workforce. The skills gap is recognised as having a significant impact on business performance, e.g. in areas relating to network management, energy efficiency, procurement, construction skills for energy efficient buildings.
Regional Innovation Strategy (RIS)	This is central to a thriving and innovative economy. New technologies such as fuel cells, innovative transport solutions, low carbon technologies will all benefit from being closely integrated into this strategy.
Regional Housing Strategy	Under development (due 2005). This is highly relevant because there are opportunities available through it to implement measures to reduce emissions and address fuel poverty.
Regional Waste Strategy	Significant influence on issues such as the landfill gas resource and the development of biogas and other treatment technologies.
Regional Climate Change Strategy	Establishes a baseline position, identifies likely impacts and potential adaptation strategies for climate change in the Region.
Regional Wood Energy Strategy	Wood for Energy - Energising the West Midlands for the 21 st Century. One of the key recommendations is to establish a regional network for wood energy, which is now being piloted in the Rural Regeneration Zone through a

	partnership of Heartwoods (www.heartwoods.co.uk) and Marches Wood Energy Network (www.mwen.org.uk). It also links to the Regional Forestry Framework.
Regional Forestry Framework	Includes energy generation and opportunities from carbon sequestration, as well as recycling. Aims to make a significant contribution to West Midlands energy supply for business, public sector and domestic markets.
Regional Transport Strategy	To ensure that the transport system underpins the economic revitalisation of the West Midlands metropolitan area. Sustainable transport is a key component, including demand reduction, modal shift, vehicle efficiency, travel plans, as well as biofuels.
Regional Sustainable Development Framework	Sets out a vision for the West Midlands to 2025 to become a sustainable region through improvements to quality of life, social progress, environment and a healthy economy. Energy use is a key issue, including energy efficiency, renewable energy and transport.
Regional Marketing Strategy	Possible position for West Midlands as an energy efficient region.
Information and Communications Technology Strategy	Use of broadband can encourage home working, and development of e-business, can both influence energy use.
West Midlands Visitor Economy Strategy	Increased tourism may lead to increased transport energy use. Sustainable tourism and more sustainable transport needed to minimise this.
Regeneration Zones	Zones provide a geographical focus for work to regenerate communities, improve skills and create the conditions for growth. New development opportunities in housing, industry, services, provide opportunities to build to high standards of energy efficiency, and to support business enterprises in energy efficiency and renewables.
High Technology Corridors / Belts	Attracting and developing technology-based, high value added businesses in specific geographical areas. Opportunities for research and spin-out businesses in new energy technologies. New property to be built to high standards of energy efficiency.
Business Clusters	Groupings of businesses, research and academic institutions, suppliers and service providers linked through a common product or technology. The Environmental Industries cluster in the Region supports business opportunities including energy efficiency, renewables, fuel cells, high efficiency vehicles. Also provides support for energy efficiency advice.
Neighbourhood Renewal Strategy	Local response to the government's national neighbourhood renewal. Opportunities for new and refurbished housing to be built to high standards of energy efficiency, and to ensure housing meets decent homes standards especially those occupied by vulnerable groups.

Annexe E: Renewables

Existing Situation

In November 2001, GOWM commissioned a report⁵² on the potential for the generation of renewable electricity in the West Midlands, which included an estimate of current renewable electricity generating capacity (see Table 14).

Table 14: Estimate of West Midlands Renewable Electricity Generation (2001)

Source	Mass burn incineration	Landfill Gas	Sewage Gas	Hydro	PV	Wind	Biomass
Current (GWh/yr)	502	240	47	3	0.1	0	0

This study gave an estimated 2001 generating capacity of 792 GWh, or approximately 2.6% of West Midlands consumption.

- However, the majority of this is derived from energy from waste in the form of mass burn incineration, which is no longer counted as renewable. Excluding this, the total 2001 capacity was approximately 1% of consumption. Heat and transport fuels were excluded from the GOWM study.
- **Landfill gas and sewage gas:** Both landfill gas and sewage gas are being increasingly harnessed in the region.
- **Biogas:** R&D and pilot anaerobic digestion schemes in Shropshire are demonstrating that restaurant and household food waste can successfully be used to generate soil nutrients and biogas that can be used for heating.
- **Wind:** No large-scale turbines have yet been deployed in the West Midlands, despite reasonable levels of resource and interest from developers.
- **Biomass:** There are four types of biomass installation and activities in operation or being considered in the region:
 1. Biomass fired electricity power stations. There are currently no operating systems in the region, although one proposal for a 20 MW installation in Herefordshire falls into the category.
 2. Co-firing biomass in fossil fuel fired electricity power stations⁵³. The coal-fired power stations at Ironbridge and Rugeley currently burn imported biomass although the use of local wood fuel is being investigated – this could improve the sustainability of the process.
 3. Biomass heat-only installations. As well as the domestic use of wood fuel, there is about 1.9MW of automatic wood chip boiler capacity installed in the region.
 4. Biomass powered combined heat and power (CHP). There are currently two small (under 10MW) installations under development in Herefordshire and Staffordshire.
- **Hydro:** There are currently only a small number of operational small-scale schemes in the West Midlands, with a capacity of around 550kW, generating some 3GWh of electricity a year. These schemes have been developed because they have been commercially viable

⁵² Renewable Energy Prospects for the West Midlands. Halcrow Group. Government Office for the West Midlands. November 2001.

⁵³ Between April 2002 and October 2003 the Ofgem ROC register shows that Ironbridge has generated 3,300 MWh of electricity from biomass while Rugeley has generated 171 MWh.

or as a result of either the involvement of a hydro enthusiast or with the support of grant funding.

- **Photovoltaics:** Halcrow noted about 72kW of PV in the West Midlands in 2001. There could soon be as much as four times this. 300kW of PV would develop around 0.23 GWh of electricity.
- **Solar thermal heating:** From national figures, we estimate that there are around 4,500 domestic solar water heating systems in the West Midlands, which would develop an estimated 5.4GWh of energy, displacing a variety of fuels.
- Currently, there is no PV panel industry in the West Midlands, though solar water heating panels are made in the conurbation.

Forecast Change

The 2001 GOWM / Halcrow report⁵² assessed the scope for growth of renewable energy in the West Midlands. It concluded that up to 3,000 GWh of electricity, around 10% of present consumption, could be generated each year if renewable energy were fully developed to its economic potential, as shown in Table 15.

Table 15: GOWM/Halcrow (2001) Assessment of renewable energy potential in the West Midlands

Source	Energy from waste (1)	Landfill Gas	Sewage Gas	Hydro	PV	Wind	Biomass
Potential (GWh/yr)	784 (2)	637	76	7	11	1345	133

(1) This is mass-burn incineration, which is ineligible for ROCs

(2) This figure of 784 GWh included 51 GWh from a proposed plant at Kidderminster, which will not now go ahead

The Working Group critiqued this appraisal and found that none of the technologies would be likely to be developed up to Halcrow's estimated potential by 2010. Reasons are outlined in the technology by technology assessment in section 5.3.

Existing Targets

Electricity Targets - Currently, the Government has targets for 10% of electricity to be generated from renewable sources by 2010 rising to 15% by 2015. In addition, there is an aspiration for 20% of electricity to be generated from renewable sources by 2020. For the West Midlands, 10% would represent 3 TWh/year of generation at today's consumption levels. This is against a long term trend of increasing consumption, currently averaging 1½-2% per annum.

The West Midlands is one of only two landlocked regions in the UK – the other being London, which has, of course, a significant tidal estuary. Therefore, the West Midlands will be unable to develop offshore wind, wave, submarine turbine and tidal generation of electricity. Marine generation is likely to be significant: current predictions are that offshore wind alone may be able to provide as much as 5% of the UK's electricity consumption.

Heat and Transport Targets - The Royal Commission on Environmental Pollution (RCEP) reported⁵⁴ that biomass should be recognised as a valuable resource for both heat and power, and should receive support to stimulate the use of biomass resources. For transport, the government is currently consulting on identifying possible targets for biofuels sales by 2005 and 2010, in line with the EU's Biofuels Directive.

The electricity target has successfully focused the attention of stakeholders on working to overcome barriers to take-up. This is despite the fact that it tends to discourage integrated sustainable energy solutions. The renewables working group has proposed objectives rather than targets, in case national targets are negotiated later. These objectives are aimed at ensuring an increase in the regional capacity for renewable heat and transport and the development and encouragement of the technologies that are most appropriate to meeting the region's needs.

CHP target - There may be some development of wood CHP as part of the DEFRA drive to reach 10GWe of CHP nationally by 2010. Biomass CHP is a rapidly maturing technology though gas CHP is likely to be most important in the short and medium term (see non domestic energy).

The Energy Act will implement commitments in the Energy White Paper to help reach renewable energy goals by providing a legal framework for the development and operation of offshore windfarms, maintain the reliability of our energy supply and promote competitive energy markets.

With mass-burn Energy from Waste no longer included in the renewable fuel mix in the region, and no access to marine renewable resources, a target for electricity of 10% of regional consumption to come from renewables by 2010 is inappropriate for the West Midlands.

The Strategy therefore proposes a stretching target of 1250GWh by 2010 - some four times current renewable generation capacity - in addition to the 380GWh expected to be achieved by 2010 through co-firing. If a 15% reduction in electricity consumption is achieved by 2010, this will be equivalent to 5% of consumption, or 6.4% including co-firing.

There is then an ambition to continue to increase renewable generation capacity to 1700 GWh by 2020 and migrating co-firing capacity to locally sourced biomass-CHP. The Region could therefore reach a figure of 10% of electricity from renewables by 2020, reached through a mixture of new installations and demand reduction.

The expected contributions from different technologies are outlined in the table below. The following brief notes relate to the individual technologies.

- The contribution of **wind** depends heavily on the number of MW-scale turbines that can be installed. Halcrow 2001 suggested 512 MW installed where wind speeds are 7m/s or more, leading to 1345 GWh being generated annually.
- The contribution from wind can now be revised in the light of the West Midlands Wind Energy Resource Assessment (March 2004) and the recent West Midlands Regional Urban Wind Study. The Wind Resource Assessment concluded that there was potential for

⁵⁴ Biomass as a Renewable Energy Source, www.rcep.org.uk

between 65-150 MW of wind energy in areas with wind speeds in excess of 7 m/s - the lower limit assumes a 50% success rate. The Urban Wind Study demonstrates that there are opportunities to develop nearly 100 MW of wind energy in and adjacent to urban areas of the West Midlands. Levels of developer interest in the findings of the Urban Wind study, combined with the areas of potential identified in the Wind Resource Assessment, strongly suggest that a 100 MW target for wind could be achievable by 2010. With a more positive planning framework for wind energy, as advocated in the new PPS22, a target of 300 MW by 2020 might not be unrealistic.

- *A more likely figure of 50-150 MW is proposed, generating 130-400 GWh a year installed under current circumstances with maybe twice that only being obtained with a far more benign regulatory regime.*
- There are several barriers to wind development which need to be addressed if the wind resource is to be harnessed to any significant degree in the Region. None of these issues is insurmountable. In any foreseeable scenario, wind energy will play a vital role in meeting renewables targets in the Region.
- **Biogas** technology utilises the gas produced by fermenting putrescible material to generate heat and electricity. The sources of these wastes are sewage wastes, kitchen waste, manure from poultry, cattle and pigs, commercial catering waste, food processing and abattoir wastes and energy crops. It has many benefits, in that it produces, as a by-product, materials that can be used as fertilisers and soil conditioners, and can be used to divert organic materials from landfill. It is disproportionately effective as a tool for climate change mitigation as it converts methane into carbon dioxide, which is a far less damaging greenhouse gas.
- The assessment indicates that 935 GWh may be available from biogas-fuelled CHP plant. Roughly 30% of this could come from energy crops, covering 0.1% of the UK's farmed land, or around 1.25% of the Region's farmed land. A further 11% comes from sewage waste. 560 GWh comes from other wastes.
- An estimated 1,025 GWh of heat would be available from biogas-fuelled CHP plant of which 560 GWh would be available purely from non-sewage waste. If 30% of the resource were developed, it would furnish 1% of the Region's estimated electricity consumption and about 0.3% of heat.
- For reasons of topography all **hydro** developments in the Region will be small scale and, for the most part, "run of river" systems. The resource within the region is therefore very limited and is unlikely to exceed the estimate of 7GWh/year estimated in the Halcrow Report. Smaller schemes are more feasible with far less environmental impact and there are many disused water mills that may offer the possibility of relatively straightforward and economic electricity generation.
- Hydro-electric schemes are much more site specific than wind schemes. It is likely that all hydro developments in the Region will be incorporated into existing weirs and so will not involve the construction of impoundment dams or long penstocks. There are a number of other potential schemes, in the 50–500kW range, in the West Midlands which are likely to be commercially viable and are either under development or developers have outline plans

for their development. There are also a limited number of water supply company sites where hydroelectric potential exists via the existing gravity distribution system.

- **Solar water heating** is probably more appropriate than photovoltaics for the Region as there is a significant and expanding industry and it can deliver carbon savings much more cost-effectively, especially where it displaces electrically-heated water. There is a strong case for encouraging the retro-fit of solar water heating in off gas-grid areas, and the inclusion in new-build dwellings across the region.
- For **biofuels**, the adoption of **biodiesel** would give the Region the opportunity to take control of at least part of our transport fuel consumption at little or no additional cost, whilst achieving worthwhile carbon savings. The raw materials – oilseed rape and waste vegetable oil – are available from the waste stream and local agriculture. Commercial biodiesel undergoes “esterification” in order to improve its performance. **Bioethanol** is also starting to offer opportunities for business diversification, based on fuel sources such as apples or sugar beet, although this is not yet commercially viable in the UK.
- **Biomass** has an important part to play in the renewable energy mix of the region. There are significant opportunities for rural communities and businesses to develop biomass as an energy resource, from wood and forestry residues in the forestry sector and from non-food energy crops (miscanthus, short rotation coppice). Landscape character and biodiversity considerations should be taken into account for all of these prospects. The exploitation of biomass resources needs integrated actions in order to be successful - e.g. identifying biomass resources, linking supply with demand, raising awareness and providing know-how, developing fuel supply chains and supporting local businesses.
- **Heat pumps:** We have estimated that in the region of 5 TWh of electricity is used for heating in the Region. To get 1% of this figure supplied using heat pumps, we would need to deploy around 3000 domestic installations and 250 medium sized installations, for example in small off-gas grid schools.

Table 16: Renewable Energy In The West Midlands - Expected Growth

	Halcrow 2001 ⁵⁵ Current (GWh/yr)	Halcrow 2001 Max Estimate (GWh/yr)	Strategy Estimate Max (GWh/yr)	Strategy Est. Possible by 2010 (GWh/yr) low	Strategy Est. Possible by 2010 (GWh/yr) high	Strategy Est. Poss by 2020 (GWh/yr)	Notes
Electricity							
Mass Burn Incineration	502	784	0	0	0	0	A
Landfill Gas	240	637	637	240	637	637	B
Sewage Gas	47	76	76	47	76	76	C
Hydro	3	7	7	7	7	7	D
PV	<1	11	3	3	3	11	E
Wind	0	1345	900	130	400	900	F
Biomass electricity-only & CHP	0	133	560	80	80	240	G
Biogas-CHP	1	-	526	26	53	184	H
Co-firing	0	-	380	380	380	0	I
Total	291	2993	3089	913	1636	2055	J
Assumed annual consumption (GWh)	30000	30000	30000	25500	25500	19500	K
% annual consumption: no co-firing	1%	10%	9%	2%	5%	10%	L
% of annual consumption: w/co-firing	1%	10%	10%	3½%	6½%	10%	M
kT CO ₂ saved	125	1287	1328	393	703	884	N
% total WM emissions (electricity+heat+transport)	0.2%	2.5%	2.6%	0.8%	1.4%	1.7%	O
Heat							
Biomass heat-only	4	-	168	18	18	50	P
Biomass CHP	0	-	448	25	50	200	Q
Ground Source Heat Pumps	3	-	50	50	50	100	R
Solar Water Heating	5	-	1200	8	24	100	S
Biogas-CHP	2	-	570	28.5	57	200	T
Total	14	-	2436	131	252	650	U
Assumed annual Consumption (GWh)	91000	-	91000	82000	82000	68000	V
% of assumed annual consumption	.01	-	2.5	0.16	0.3	1.0	W
Transport							
Biodiesel	-	-	-	0	459	-	-

⁵⁵ Halcrow 2001 refers to the Halcrow Renewables Study from 2001.

<p>A – Mass burn incineration is now excluded from renewable generation.</p> <p>B – Assumes no change on 2001 development of resource to 2010 for low figure, full development of resource for high figure. Also assumes resource plateau between 2010 and 2020 then declines. Current (2003) capacity is 36 MW. Note - the estimates for future resource are subject to revision.</p> <p>C – Assumes no change on 2001 development of resource to 2010 for low figure, full development of resource for high figure.</p> <p>D – Assumes full development of resource – likely as most resource is economic and smaller schemes will qualify for Clear Skies support.</p> <p>E – Assumes that current levels of take up increase to national average, then increase by 10% a year for domestic installations and 20% a year for community installations to 2010. Assumes step change in support to 2020.</p> <p>F – Assumes no real change in planning policy but active encouragement to 2010, followed by encouraging planning policy and other regulatory policies plus wider public acceptability to 2020. Note - this estimate does not take account of any additional capacity identified in the Urban Wind Study 2004 and the revised Assessment of Wind Energy Resource 2004.</p> <p>G – Figures as per wood resource survey MWEN/DEFRA Annex 4.5.</p> <p>H – Assumes 5-10% development of regional resource to 2010, and 35% by 2020 as proposed by Greenfinch, less their estimates for contributions from sewage gas and energy crops.</p> <p>I – Figures as per wood resource survey MWEN/DEFRA Annex 4.5. For co-firing, from 2009 there is a gradual requirement to change from biomass to energy crops. By 2016 all co-firing must use energy crops to be eligible for ROCs.</p> <p>J – Total. This line shows where targets discussed in the text come from.</p>	<p>K – Assumed annual consumption of electricity, from which calculation of proportion generated by renewables is derived. Estimated to be 30TWh now. These figure give an estimate of the proportion coming from renewables if electricity consumption were to reduce by 15% by 2010 and 35% by 2020. The figures are for demonstration only, but there is a strong link between these figures and targets returned from the energy efficiency working groups.</p> <p>L – Percentage of annual electricity consumption produced from renewable sources, not including co-firing. Assumes annual consumption given in row K.</p> <p>L - Percentage of annual electricity consumption produced from renewable sources, this time including co-firing. Assumes annual consumption given in row K.</p> <p>N – kT CO₂ saved by this level of implementation using figure of 0.43kgCO₂/kWh as per DEFRA Environmental Reporting Guidelines 22 March 2001.</p> <p>O – % of current CO₂ emissions that would be displaced by level of renewables highlighted in Row J, based on current estimate of CO₂ emissions of 51 MT, which excludes aviation.</p> <p>P - Figures as per wood resource survey MWEN/DEFRA Annex 4.5.</p> <p>Q – Assumes that biomass-CHP will form increasing proportion of biomass electricity generation and that waste heat output will be equal to the electricity output.</p> <p>R – Assumes a tenfold increase in number of pumps to 2010 (3000 domestic, 250 larger), followed by a fourfold increase in 2010-2020.</p> <p>S – Assumes Clear Skies grants taken up pro-rata to 2010 for low figure, 1% of homes for high figure, and 8% of homes in 2020.</p> <p>T - Assumes 5-10% take-up by 2010, 35% by 2020.</p> <p>U – Totals.</p> <p>V – Assumes demand for heat decreases by 10% to 2010 and by 25% to 2020.</p> <p>W – Assumes 10% reduction in consumption and 40% take up of 5% biodiesel.</p>
--	---