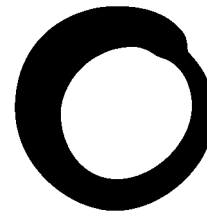


August 2009



**Friends of  
the Earth**

# Briefing

# Getting serious about local low- carbon and renewable energy

This document is aimed at those who want to read more about how Friends of the Earth believes low carbon energy can contribute to a local authority reducing carbon emissions by 40% by 2020. It does not attempt to be an exhaustive resource with detail on every aspect of local energy generation. Instead it should be viewed as an illustrative document which gives a flavour of the ways in which carbon can be reduced through Local Authorities becoming a part of the shift to a low carbon energy system.

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### **Introduction**

Tackling climate change is more urgent than ever. Taking serious action now to cut greenhouse gas emissions is the way to avoid worsening floods and droughts, rising food prices and economic instability across the UK. In England and Wales 5 million people are already at risk of flooding.

The science is clear: rich countries need to cut their carbon dioxide emissions by at least 40 per cent by 2020 to avoid the worst impacts of climate change. Local government has a crucial role to play in driving the changes that will create real benefits for local people while helping keep our climate safe.

The UK has signed a Europe-wide agreement to get 20 per cent of all energy from renewables by 2020 – that's not just electricity, but heat and transport fuel too. The UK's share of this target is 15 per cent. We have a long way to go to reach this benchmark – in 2006 less than 2 per cent of all UK energy came from renewables. But 2020 is not the endpoint. We must cut UK CO<sub>2</sub> emissions by 90% by 2050, and this switch to a zero carbon society will require a revolution in our use and generation of energy.

Renewable energy generation will be delivered at all scales from massive offshore windfarms to small scale microgeneration on homes and workplaces. Energy generation will become more decentralised, and 'smart grids' will be required to ensure integrated and efficient generation and use of energy. To make the transition to low carbon as quickly as possible we need to improve the efficiency of our use of fossil fuels, especially through more widespread use of high efficiency combined heat and power (CHP) and district heating systems. Combined heat and power will be required at a variety of scales, from small scale community-based projects, to larger schemes designed to capture the heat from large scale power generation.

Local authorities have a track record of innovation and leadership in developing energy schemes, from early experiments in electricity generation, CHP and district heating, to the creation of the 'Merton Rule'. They now have an important role to play in delivering the local changes required to develop a low carbon energy system for the UK in two key areas:

- 1 – adopting a proactive role in establishing the necessary local energy infrastructure, including the use of renewable and low carbon energy on the local authority estate;
- 2 – creating a planning environment where low-carbon energy can be delivered by other stakeholders (e.g. energy companies)

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### **1 – DELIVERING LOW CARBON INFRASTRUCTURE**

Local authorities are large purchasers of both energy and energy services in their local areas, have a large estate, and a portfolio of buildings which can provide baseloads and long-term supply contracts as anchors for community energy projects, particularly district heating networks. Local authorities should lead by example in implementing sustainable energy projects. Local authority owned land may be suitable for wind turbines, and buildings offer the potential for CHP, solar PV and solar water heating. District heating should be considered for housing estates and new developments as well as public buildings such as schools, swimming pools, hospitals and education facilities. Local authorities may choose to develop such projects in-house or by establishing an Energy Services Company.

#### **Energy Services Companies (ESCOs)**

Energy Services Company (ESCO) is a broad term used to describe an independent agency which can deliver low and zero carbon energy. ESCOs are set to become an increasingly important tool for local authorities as they begin to take a more active role in developing the UK's low carbon infrastructure. ESCOs have already been responsible for delivering a number of highly praised low carbon energy initiatives around the UK, including Southampton City Council's geothermal & CHP powered district heating and cooling scheme, and the Birmingham District Energy Company's District Heating scheme.

#### **Case Study: Birmingham District Energy Company**

Birmingham City Council and the Utilicom Group entered into partnership to form the Birmingham District Energy Company (BDEC). BDEC provides sustainable energy, in the forms of heat, cooling and power, to some of Birmingham's most prominent buildings, including the National Indoor Arena, the Council House and the Town Hall. The Combined Heat and Power system utilises heat that is generated as a by-product of electricity production, in order to heat buildings. The system saves businesses and the council approximately £150,000 in energy costs and reduces CO<sub>2</sub> emissions by approximately 3,800 tonnes per year. The scheme will be expanded to cover Aston University, the Children's Hospital, Eastside and will form part of the city's Building Schools for the Future Programme.

Local authorities have powers to establish an ESCO under the Local Government Act 2000, which allows them to promote or improve the "the environmental well-being of their area". ESCOs usually take the form of a limited company, set up to do some or all of the jobs of designing, building, and operating the infrastructure. An ESCO can be wholly owned by the private sector or be a public/private joint venture. The nature of the ESCO required will depend on the degree of technical experience held by the local authority and its in-house competence to deliver the project, and the local authority's attitude to risk. A greater degree of local authority ownership may be desirable to secure additional objectives for the ESCO such as alleviation of fuel poverty, while greater private sector involvement gives greater financial flexibility, and greater freedom from the regulations governing local authorities such as procurement legislation. Key advantages of an ESCO are that its independent nature allows it to maintain focus on its key objectives, and its private sector involvement transfers the risk from the local authority, and increases the potential to raise capital.

In the UK, ESCOs have been generally used to establish CHP schemes, as these have up to now been the most financially viable, and other legislation has tended to inhibit local authority initiatives

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for electricity generation from renewables. Changes are now afoot, and with the Government announcement to remove the restriction on local authorities selling electricity from non-chp sources, we would expect to see a greater variety of schemes in future.

Excellent guidance on establishing an ESCO has been produced by the London Energy Partnership: Making ESCOs Work: Guidance and Advice on Setting Up and Delivering an ESCO. 2007.  
[http://www.lep.org.uk/uploads/lep\\_making\\_escos\\_work.pdf](http://www.lep.org.uk/uploads/lep_making_escos_work.pdf)

The Energy Savings Trust have also produced a guide to setting up an energy services scheme, and offer free consultancy support for local authorities wishing to establish an ESCO: Energy Services Directory. A guide for local authorities, housing associations and community groups. EST, 2007  
<http://www.energysavingtrust.org.uk/business/Global-Data/Publications/Energy-services-directory>

**Finance** for an ESCO is usually a combination of grants, plus commitments from the local authority and private sector partner, the latter often borrowing secured against the project contract. A number of potential sources of funding grants are listed below. More details, and information on additional sources of funding are available via the EST funding database  
<http://www.energysavingtrust.org.uk/business/Business/Local-Authorities/Funding>

Low Carbon Infrastructure (LCI) funding through the Homes and Communities Agency (HCA),  
<http://www.homesandcommunities.co.uk/low-carbon-infrastructure>

Salix – a publicly funded company that provides interest-free matched funding to invest in energy efficiency and carbon-reduction in the local authority's own estate.

<http://www.salixfinance.co.uk/home.html>

Other funding options include: Carbon Emissions Reduction Target (CERT ) funding; public-private partnership (PPP) through which local authorities access new or improved capital assets; Section 106 requirements on developers to provide ESCOs; and Community Infrastructure Levy (CIL) to fund new green infrastructure.

#### **More information on the role of ESCOs:**

“Review of energy services in the domestic sector”. EST.

<http://www.energysavingtrust.org.uk/business/Publication-Download/?oid=179280&aid=424051>

Community Heating and Combined Heat and Power. NHBC

<http://www.nhbcfoundation.org/LinkClick.aspx?fileticket=Ev%2f%2bSNIFrK4%3d&tabid=339&mid=774&language=en-GB>

Community Energy: urban planning for a low carbon future. TCPA & CHPA. 2008

<http://www.tcpa.org.uk/pages/community-energy-urban-planning-for-a-low-carbon-future-.html>

### **Reaping local benefits**

Sustainable and renewable energy projects can do more than help meet targets for carbon reduction. They can also be used to generate revenue, fund community improvement, create employment, and address issues such as fuel poverty. In order to capture maximum benefit for the local community, local authorities should consider taking a more proactive role and initiating their own low-carbon energy projects. A number of options are available, including local authority or community

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ownership, development of renewables/chp via an ESCO, and seeking revenue by promotion of renewable energy by a third party on the local authority estate.

Countries such as Germany, Spain, the Netherlands and Denmark have demonstrated great success in rapid implementation of renewable energy technologies, particularly wind and solar. In the case of windpower, some of this success is attributed to much greater levels of community acceptance, often based on the greater degree of benefit accrued to the community through, eg local taxes or a share in revenues through community ownership.

Local authority ownership of renewable energy projects is a new concept in the UK, but has been realised in countries such as Denmark. Copenhagen's local authority-owned energy utility owns ten turbines in the Middelgrunden offshore windfarm, alongside 10 cooperatively owned machines. Procurement legislation may make this a complex model for the UK. Community ownership of renewable energy projects is also rare in the UK, but there are a growing number of community-owned projects which allow local people to share in the revenue generated by the project.

One of the leading promoters of community-owned renewable projects is **Energy4all**, who have successfully completed a number of projects including the 100% community owned Westmill Windfarm in Oxfordshire, and a number of schemes that involve part ownership of windfarms, where one or more turbines are owned by the community. Energy4all are currently working with East Midlands Development Agency (EMDA) on the promotion of a number of community owned projects throughout the West Midlands, including the proposed Gartree windfarm in Market Harborough. Once completed, the 100% community owned project will consist of three turbines generating enough power for around 4500 homes. EMDA's encouragement of community-owned projects could be a useful and important model for local authorities to replicate, and thereby maximise local benefit and acceptance of the technology.

Energy4all have produced a step by step guide for communities wishing to establish their own wind energy projects here: [www.energysteps.coop](http://www.energysteps.coop)

#### **Case study:**

Another model of community ownership is illustrated by the Torrs Hydro New Mills project, in New Mills, Derbyshire. This is the first community funded hydro electric scheme in the UK. The scheme was initiated by a social enterprise, Water Power Enterprises, in partnership with the local community, and funded by grants and a share offer to local people. The scheme is operated as an Industrial and Provident society, which uses the revenues received for the benefit of the local community. An Archimedian Screw drives a 70kW turbine generating around 240 000kWh per year.

The development of renewable energy projects by a third party on public land is the concept behind **Partnerships for Renewables (PFR)** a limited company created by the Carbon Trust. PFR aims to develop 500MW of renewable energy round the UK – primarily through windpower, plus other projects such as hydro, and biomass schemes. PFR is a low risk option that meets public procurement guidelines. PFR identifies potential sites, and covers all costs of development, construction and operation of the projects. A typical windfarm may then generate annual revenues for the local authority of £30,000 in rental for each 2.5MW turbine, with an additional £2,500 contribution to a community benefit fund. PFR also offers the possibility of establishing private wires, whereby electricity is provided exclusively for use by neighbouring business, thereby avoiding transmission and distribution network charges and enabling the provision of electricity at prices up to 20% below the market rate.

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For more information see [www.pfr](http://www.pfr)

### **Generating change**

In May 2008 Clackmannanshire Council started working with Partnerships for Renewables (PfR) to develop wind turbines on council-owned land. PfR screened the council's estate and identified potentially suitable sites, and has signed a lease option for construction of up to four turbines on a landfill site next to a sewage works. The company will cover the cost of all development, construction and operation. On completion of the project each turbine will save more than 2,800 tonnes of carbon dioxide a year, the council will receive rental payments, and local residents will share in a generous community benefits package. Establishment of grid connection may enable additional generation through utilisation of landfill gas from the site.

### **Community Funds**

Many wind farm developments include a financial contribution to the local community, known as 'community fund'. The payment may be annual, linked to revenues, or a lump sum, and can be used to pay for measures which benefit the local community, ranging from energy-related projects which support microgeneration or energy efficiency improvements in local homes or community buildings, to improvements in local facilities such as sports facilities, or repairs to village halls.

More information on community benefit, and 'Community Funds', can be found in the publication "Delivering Community Benefits from Wind Energy Development: A Toolkit"

[http://www.foe.co.uk/community/campaigns/climate/support\\_local\\_renewables.html](http://www.foe.co.uk/community/campaigns/climate/support_local_renewables.html)

### **Feed-in Tariffs and the Renewable Heat Incentive.**

A major factor crucial to the success of smaller scale renewable energy projects is the adequacy of an effective financial framework. Following a Friends of the Earth-led campaign, Feed-in Tariffs (FITs) for small scale renewable electricity generation up to 5MW capacity are due to be introduced in the UK in April 2010. These fixed tariffs for renewable generation confer greater financial stability and hence easier and cheaper access to capital, bringing the ownership of renewable generation to a much broader constituency and making it much more financially attractive. They are also less complex than the existing support scheme, the Renewables Obligation (RO). The exponential growth of renewables witnessed in countries such as Germany and Spain is attributed, at least in part, to the existence of Feed-in Tariffs: not only do they overcome the hurdle of high cost which inhibits uptake of more expensive technologies such as PV, but also improve acceptability of large scale technologies such as windfarms, by facilitating local ownership and, as a result, local acceptability. There is every reason to be optimistic that a well designed FIT regime will bring about similar renewables growth in the UK. Introduction of a FIT should significantly improve the financial returns, offers the opportunity to make money out of small scale renewables, and could represent a valuable source of income for communities and local authorities, especially in the case of technologies such as small windfarms and single turbines.

Changes to the regulatory regime, including proposals outlined in the RES to remove restrictions preventing local authorities supplying electricity to the grid, will also facilitate a role for local authorities as energy generators.<sup>1</sup>

From April 2011 a new Renewable Heat Incentive will provide similar incentives for individuals, community groups and businesses to install renewable heat technologies at all scales.

More information on FITs see:

[http://www.foe.co.uk/resource/briefing\\_notes/feedin\\_tariff.pdf](http://www.foe.co.uk/resource/briefing_notes/feedin_tariff.pdf)

## **Getting serious about local low-carbon and renewable energy**

### **2: - CREATING A PLANNING ENVIRONMENT TO DELIVER LOW-CARBON ENERGY**

National targets for renewable energy generation are dependent on the successful implementation of individual projects around the UK. Achievement of these targets requires a commitment to delivery at the local level, through the development of local strategies to promote renewable and low carbon energy, and the adoption and application of appropriate policy to the planning system to ensure that the necessary generation capacity and supporting infrastructure get built. At present we are still witnessing a failure to deliver, and the planning system is often cited as a major barrier to implementation of renewable energy projects on the ground as we witness many projects, particularly windfarms, being refused planning permission, with much of the blame for UK's slow progress in meeting targets attributed to local authorities.

Local authorities play a key role in deciding what gets built where, and must learn to play a more active role in delivering new renewable and sustainable energy generation, both in terms of large, stand alone projects like windfarms, district heat grids, and smaller scale roll-out of renewables.

Local authorities play a direct role in deciding the success or failure of individual proposals for renewable energy proposals through the planning system. There are two ways a renewable project can gain planning approval:

- For renewable energy schemes up to 50 megawatts (50MW), local planning authorities are responsible for granting or refusing planning permission for the scheme
- Larger applications are submitted for the Secretary of State to make a judgement.

Local authorities may also request that applications approaching the 50 MW limit are 'called in' for determination by the Secretary of State. In both cases determined by the SoS, the authority will remain a statutory consultee.

The high failure rates for planning permission for renewable energy projects can be attributed in part to a vocal opposition to new development, especially windpower due to its visual impact, but also due to a failure to understand the role and need for renewable energy, and successfully integrate it within a local authority's priorities. There is often little sense of any responsibility to take action, nor awareness of the relevant planning guidance or its new emphasis on climate change as the overriding priority. Some case officers will encourage councillors to take a balanced view, others will not.

The key to reversing this trend lies in changing the culture to one in which local authorities proactively seek to achieve renewable energy targets. There have been a number of attempts to do this through publication of revised national planning guidance (see below) but too few local authorities have responded adequately and put climate change at the top of their planning agenda. Some progress has been made, but the majority of local authorities – especially those in rural areas – have inadequate climate and renewable energy planning policies, and have failed to meet renewable energy targets set out in regional spatial strategies.

The good news is, the Government has now proposed that national planning guidance prioritising climate change and renewable energy should be strengthened.

The principal elements required within a local authority to achieve change are:

- ambitious emissions reduction targets

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- ambitious targets for renewable energy
- strong evidence base identifying renewable resources, and areas for renewable development (excluding statutory conservation areas)
- mapping of heat demand
- strong policies in core strategy
- good training for planning officers and councillors, especially planning committee members

### **Planning policy: what is it and what influences it?**

The **Local Development Framework (LDF)** is the council's planning policy. It is meant to be based on the objectives of the local community strategy, and must also comply with the Regional Spatial Strategy (RSS). The council must put together this plan for development of the council area. The LDF is important because it may contain targets or policies that favour energy efficiency, renewables, climate change or sustainable transport.

A best practice Local Development Framework should contain the following:

- clear and prescriptive policies encouraging the development of renewable energy
- a strong evidence base on renewable energy resources
- areas mapped out for renewable energy development.

There is clear guidance contained in national planning policy setting out the role of local authorities in meeting renewable energy targets. Regional targets should be a consideration when determining applications for renewables projects, but again, are often ignored.

With strong Development Plan Documents as the starting point, Supplementary Planning Documents can be used to support the development of low carbon energy strategies for major new masterplans, regeneration areas and development sites, with the mix of technologies and requirements tailored to the location, urban form and context, as well as setting out policy on deriving community benefit from renewables and low carbon development.

The development of the LDF is guided by **national planning guidance**. The two most relevant are **Planning Policy Statement 22: Renewable Energy (PPS22)** and **Planning Policy Statement 1 supplement 'Planning and Climate Change'**

**Planning Policy Statement 22** was published in 2004, and stipulates that regional strategies, and local development documents should contain policies to promote and encourage renewable energy, and that local and regional stakeholders should foster community involvement in renewable energy projects.

**PPS 1 Supplement 'Planning and Climate Change'** was published in December 2007, and gives the strongest guidance yet on incorporating climate change as a priority consideration for the planning system. The 'Climate PPS' makes it absolutely clear to planners and politicians that they must put climate at the top of the planning agenda, and emphasises the importance of a proactive approach to renewable and low-carbon energy, calling on local authorities to:

- Assess potential for local low-carbon and renewable energy.
- Actively promoting renewable and low carbon energy production and of medium and large

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scale renewable energy projects.

- Removing unnecessarily restrictive policies which prevent the delivery of renewable and low carbon technologies
- Identify suitable locations for low carbon and renewable energy sources.

Despite some time having passed since its publication, in many instances this document is being ignored. There is a desperate need to ensure planners, councillors, and other decision makers are made fully aware of, accept, and act on this guidance.

**Regional targets for renewable energy** are contained in Regional Spatial Strategies. These are expected to be consistent with national targets. National planning guidance in PPS 22 suggests that these should be expressed as minimum levels of achievement for 2010 and 2020, and may be broken down into subregional targets. However, there is currently a considerable lack of consistency of approach in identifying generation targets and eligible technologies. Existing targets were set with reference to national targets for renewable electricity of 10% by 2010, and 20% by 2020, as set out in the Energy White Paper 2003.

Regions are required to report progress on renewable installation in their annual monitoring reports (AMRs) but again this is inconsistent across regions. However it is evident that in all cases, progress to date suggests they will fail to meet targets for 2010.

It is important to note that the scenarios contained in the recently published RES propose much more ambitious 2020 targets for renewable electricity of 32% or more, and it is clear that existing regional renewable targets will have to be radically revised upwards, and include targets for transport and heat. The RES contains a number of stronger measures to ensure delivery of renewable and low-carbon energy in the regions at a level consistent with the new 2020 target. Devolved Administrations, Regions and local authorities will be required to assess their potential, and plan to deliver on the new targets, which for the RDAs will be contained in a proposed new all-encompassing 'Regional Strategy', which will be subject to rigorous scrutiny. The Government has proposed that significant additional technical expertise will be assembled to assist RDAs and LAs in the process. The Government will be consulting on the proposed new guidance this Autumn

**National Indicators and Renewable Energy:** National Indicator 186 is one of four climate change indicators used to assess performance of local authorities, and requires local authorities to report against per capita CO<sub>2</sub> reductions in their area. Under NI 186, assessment of CO<sub>2</sub> emissions due to electricity use is calculated using data from electricity meters and applying an emissions factor of CO<sub>2</sub> per GWh, based on the average carbon intensity of the national grid. Currently NI 186 has no mechanism to take into account emissions savings due to any locally installed renewable electricity generation which exports power to the grid. Thus progress on renewable generation, from large scale renewables such as windfarms, to the export of surplus electricity from microgeneration, is not acknowledged.

As part of the current review of national indicators, the Govt is considering the development of a new renewable energy indicator. Friends of the Earth welcomes this proposal and believes this will provide local authorities with a greater incentive to embrace and promote sustainable energy technologies and deliver wider environmental benefits in the process.

More details on national indicators:

<http://www.defra.gov.uk/environment/localgovindicators/ni186.htm>

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### **Changing national planning policy: A new Planning Policy Statement for a new era**

The publication of the Government's Climate PPS was a positive step forward, but too few local authorities have put climate change at the top of their planning agenda. While there is much that can be influenced at a local level using existing planning guidance contained within PPS1 & PPS 22, it is clearly evident from progress to date that this guidance is inadequate if we are to respond to the starker scientific warnings on climate change, and meet new and tougher climate targets. Given the challenge of climate change, and the inertia demonstrated by many authorities round the UK, it is evident that we need more prescriptive measures and specifically an update of renewable energy policy in PPS 22.

As part of the UK RES, the Govt announced its intention to publish the draft of a new combined PPS in Autumn 2009. Friends of Earth is part of a coalition of organisations lobbying for this PPS, but intent on securing guidance which is strong enough to deliver the emission reductions and renewable energy needed. Specifically, we are calling for new guidance which will:

- Ensure Climate change is the first amongst equals of planning considerations
- Ensure that local plans have targets to reduce carbon in line with the Climate Change Act.
- Ensure renewable energy targets are met by incentivising action and ensure plans positively allocate sites for renewable energy
- Provide full opportunities for communities to participate in solution for their communities
- Maximise the potential of planning to reduce fuel poverty
- Ensure planning contributes to adaptation to climate change by protecting vulnerable communities and ensure positive solution such as green networks and open space are delivered.

It is hoped that this guidance will be published as proposed late this year. As soon as it is published, the draft will become a material consideration in developing new planning policy at regional and local level, and in any planning decisions that are taken.

### **Planning & Renewables: Information and Advice**

Extensive information on renewable energy and planning, and a free advice service aimed specifically at councillors and planners is available via the Planning Renewables website run by DECC, CLG, and CSE.

<http://planrenew.eniserv2.net/page/index.cfm>

More future support has been promised as part of the UK RES including establishment by ORED and CLG of an 'Expert Support Network' to provide advice to planners who are handling development proposals or drawing up local or regional plans will be able to use the network to seek advice; greater technical and policy support; and a web-base 'how to' guide for communities wishing to set up their own renewable energy projects.

### **So how do you influence the content of your Local Authorities LDF?**

Local and regional authorities should implement national policy outlined above and incorporate in their local development frameworks. LDFs are revised every five years, and undergo annual monitoring and review. Supplementary planning guidance can be adopted at any time. More information on the planning system, and how you can influence it, can be found here:

[http://www.foe.co.uk/campaigns/fair\\_future/resource/rights\\_resource\\_pack.html](http://www.foe.co.uk/campaigns/fair_future/resource/rights_resource_pack.html)

Information for activists wishing to support individual renewable energy schemes can be found here: [http://www.foe.co.uk/community/campaigns/climate/support\\_local\\_renewables.html](http://www.foe.co.uk/community/campaigns/climate/support_local_renewables.html)

**ANNEX**

**Electricity and heat - Overview of individual technologies and their contribution**

The Government's Renewable Energy Strategy includes a range of indicative scenarios by which the UK might meet its 15% target for 2020. These scenarios indicate a significant potential contribution from biomass. Friends of the Earth supports the use of sustainable biomass, but has concerns regarding a number of biomass sources identified in the RES, and believes efforts must be made to maximise the contribution of non-biomass renewable electricity to meeting the UK's 2020 renewable targets.

An overview of how renewable and sustainable energy can meet our needs is available here:

[http://www.foe.co.uk/resource/factsheets/renewable\\_energy.pdf](http://www.foe.co.uk/resource/factsheets/renewable_energy.pdf)

Key issues relating to individual renewable energy technologies are discussed below.

**Windpower**

Windpower, both onshore and offshore, is the most important technology in helping the UK to meet its 2020 renewable energy targets. While there is a perception in some quarters that wind is unreliable due to its variability, numerous studies have demonstrated conclusively that windpower can provide 40% or more of UK electricity supply and achieve major carbon savings by displacing generation from fossil fuels.

Offshore wind will make a huge contribution, and could alone generate 25% or more of the UK's electricity needs by 2020. However, offshore wind technology is still being refined, and major challenges such as construction of an offshore electricity grid and difficulties of installation of wind turbines in deep waters and a hostile environment mean that delivery of the majority of offshore will occur after 2015.

Onshore wind turbines are a proven technology, and by installing them now, we can help to make important early cuts in CO2 emissions immediately. Modern onshore wind turbines of 1 to 2 MW are the norm. An average 1 MW turbine will generate sufficient power for around 500 homes over the course of a year, and will payback the energy used in its manufacture and installation in around 6 months.

Answers to some commonly asked questions on windpower are available here:

[http://www.foe.co.uk/resource/factsheets/wind\\_power\\_your\\_questions.pdf](http://www.foe.co.uk/resource/factsheets/wind_power_your_questions.pdf)

The Sustainable Development Commission has produced a useful and detailed technical assessment of windpower :

[http://www.sd-commission.org.uk/publications/downloads/Wind\\_Energy-NovRev2005.pdf](http://www.sd-commission.org.uk/publications/downloads/Wind_Energy-NovRev2005.pdf)

One of the biggest obstacles to deployment of onshore wind turbines is public opposition, focussed largely on concerns about landscape impact and related issues. While opinion polls consistently demonstrate a majority of the public in favour of windfarms, opposition groups have been very effective in using the planning process to delay or halt development, and there is now a perception of windpower as a controversial technology. Much of this opposition can be attributed to a lack of perceived benefit by host communities, and a sense that this technology is being undemocratically imposed by big business interests. In contrast, the large scale roll-out of onshore windpower in countries such as Germany and Denmark is partly attributed to the much greater degree of local ownership (and hence local profit) or local benefit via business rates. As a consequence Germany, which has much lower windspeeds, already has over 22 000 turbines installed, while the UK, which boasts the biggest wind resource in Europe, has fewer than 2 500 onshore turbines.

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Fostering the best possible relationships between community, local authority, and developer, is hugely important in ensuring delivery of renewable energy projects, and best practice guidance is contained in 'The Protocol for Public Engagement with Proposed Wind Energy Developments in England': <http://www.berr.gov.uk/files/file38708.pdf>

A contribution is often paid by developers to a Community Fund, to be used as best seen fit by the local community, and can improve acceptance of wind projects. This is separate from any section 106 planning conditions imposed on the development. Again, guidance is available in a report by the Renewables Advisory Board: Delivering Community Benefits from Wind Energy – A Toolkit. See: [http://www.foe.co.uk/community/campaigns/climate/support\\_local\\_renewables.html](http://www.foe.co.uk/community/campaigns/climate/support_local_renewables.html)

Friends of the Earth supports the sensitive development of windfarms, and encourages communities to support local proposals. We have developed guidance for community groups which is available here: [http://www.foe.co.uk/resource/guides/supporting\\_renewables.pdf](http://www.foe.co.uk/resource/guides/supporting_renewables.pdf)

Friends of the Earth believes Local Authorities should take a proactive approach to developing local resources, and aim to capture maximum benefit for local communities through ownership, or land rental. Local authorities may decide to establish their own projects, encourage part or wholly community-owned projects, and investigate partnerships with developers.

Energy4all is the UK's foremost promoter of community owned renewables

[http://www.energy4all.co.uk/energy\\_home.asp](http://www.energy4all.co.uk/energy_home.asp)

Partnerships for Renewables is a Carbon Trust company promoting development of renewables on the public estate: <http://www.pfr.co.uk/>

### **'Onsite' windpower**

Of particular interest to local authorities is the significant potential contribution identified for "onsite" wind, ie. turbines located on land adjacent to buildings. A report by Element Energy for the Renewable Energy Consultation suggested there may be 160 000 sites around the UK with a potential to install turbines ranging from 50kW up to 1 MW, representing an installed capacity of 13GW – approximately the size of the Government's existing estimate for onshore windfarms! While these sites generally enjoy only modest windspeeds, the report concluded that wind turbine installation would be economically viable given an adequate level of support via a feed-in-tariff. The Govt has committed to introducing a feed-in tariff by April 2010. The implications of a feed-in tariff for local authorities are discussed in more detail in section XXX

<http://www.decc.gov.uk/Media/viewfile.ashx?FilePath=Consultations\Renewable Energy Strategy Consultation\Related>

[documents\1\\_20090501125345\\_e\\_@@\\_TheGrowthPotentialforonsiterenewableelectricitygenerationinthenonresidentialsectorinEnglandScotlandandWales.pdf&filetype=4](http://www.decc.gov.uk/Media/viewfile.ashx?FilePath=Consultations\Renewable Energy Strategy Consultation\Related\documents\1_20090501125345_e_@@_TheGrowthPotentialforonsiterenewableelectricitygenerationinthenonresidentialsectorinEnglandScotlandandWales.pdf&filetype=4)

### **Micro and domestic windturbines**

Small scale wind turbines can make a valuable contribution to meeting our energy targets. A recent report by the Energy Savings Trust assessing the performance of turbines currently on the market concluded that free-standing pole-mounted turbines, installed in the appropriate location with a clean-air wind resource, were seen to have very good performance throughout the UK.

There was significant early enthusiasm about the potential for building-mounted domestic wind turbines, but evidence to date suggests that currently available turbines generally perform poorly

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when building mounted, especially in urban conditions. The urban environment generally exhibits low wind speeds, and increased turbulence, especially for building-mounted machines, which significantly affects turbine performance. Vertical axis machines are expected to perform better in urban situations, but little performance data is currently available.

EST report: <http://www.energysavingtrust.org.uk/Generate-your-own-energy/Energy-Saving-Trust-field-trial-of-domestic-wind-turbines>

#### **Hydropower.**

The potential for additional large scale hydropower generation in the UK is limited, but at a local level, smaller scale hydro can make a significant contribution to electricity generation. The existence of historical use of water power is often a good indication of potential sites.

More information on hydropower, including a guide to development of micro hydro projects, is available from the British Hydropower Association: <http://www.british-hydro.co.uk/index.asp>

Key issues to be resolved for installation of hydro projects are the impact on fish and other ecological considerations, and regulations around water extraction. Both are dealt with by the Environment Agency, who have issued good practice guidelines for environmental assessment of hydropower proposals at <http://www.environment-agency.gov.uk/business/topics/water/32022.aspx>

A variety of turbine technologies are available. The Archimedes Screw is particularly suited to low water flows, and is fish-friendly. A community-owned Archimedes Screw hydro project has been developed by Torrs Hydro New Mills Ltd, an industrial and provident society based in Derbyshire: <http://www.torrshydro.co.uk/>

#### **Biomass**

There is growing attention on the potential role for bioenergy in switching to low carbon energy solutions as part of the UK's response to tackling climate change. Friends of the Earth supports the use of sustainable biomass for future energy generation, however, we have serious concerns regarding the overall sustainability of many proposed biomass sources.

#### **Definitions of bioenergy/biomass**

The terms biomass, bioenergy, biofuel and agrofuel are sometimes used confusingly and interchangeably. In this paper, we use these terms as follows:

**Bioenergy** is energy from biological sources. It is the energy that is or can be extracted from the biological material, not the material itself.

**Biomass** is the (living or recently dead) biological material from which bioenergy is extracted. Biomass is often plant matter grown to produce heat or generate electricity. Examples include timber, miscanthus, oil palm, wood chippings, biodegradable waste.

**Biofuel** is any fuel made from biomass. It can be solid, liquid or gaseous but is most commonly used to describe a liquid fuel used in combustion engines, with bioethanol (produced from starchy plants such as wheat and maize) replacing ethanol/petrol and biodiesel (produced from oil such as palm oil or rape seed oil) replacing diesel.

**Agrofuel** is used to describe biofuels created from intensively produced biomass, generally crops grown in large scale mono-culture plantations. As with biofuels, the term agrofuels can mean any fuel produced in this way, but is commonly used to describe fuels produced for transport. [http://www.foe.co.uk/resource/briefings/fuelling\\_or\\_fooling\\_europe.pdf](http://www.foe.co.uk/resource/briefings/fuelling_or_fooling_europe.pdf)

**Bio-oil** is oil extracted from biomass to be used as a biofuel.

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FOE has concerns about the sustainability of energy generation from the following sources:

- incineration
- liquid agrofuels
- large scale energy crop production.

FOE supports the following biomass technologies:

- anaerobic digestion of food and agricultural waste
- use of waste wood (burnt in clean, wood-only burners)
- woodfuel resource from UK woodland management, including sawmill and arboricultural waste.
- sustainable production of local energy crops for local consumption
- conversion of waste vegetable oil to biodiesel
- use of cereal straw

**Generation technology** The least efficient use of woody biomass and energy crops is large scale thermal electricity generation. Higher efficiencies are achieved by use for heat, or combined heat and power generation, achieving efficiencies of up to 85%. The efficiency of biomass use is highest when it is used close to production, reducing energy use in transportation. Policies should be designed to focus biomass use close to production, for district heating schemes and domestic heating, particularly off the gas network.

## **Waste Streams and Energy**

### **100% renewable waste streams**

- **Food waste**  
Food waste makes up around 20 per cent of municipal waste. It is best dealt with by separate collection followed by anaerobic digestion (AD) (see briefing ‘Food Waste Collections’ [www.foe.co.uk/resource/briefings/food\\_waste.pdf](http://www.foe.co.uk/resource/briefings/food_waste.pdf))
- **Wood and garden waste**  
Where possible wood waste should be recycled. Clean waste wood can be treated in purpose built facilities, if it can’t be recycled. Garden waste is not suitable for burning – it is often wet, eg grass cuttings, so would take quite a lot of energy to dry if it was to be burnt. It may also have soil in it. If AD is not possible, composting also has climate benefits.
- **Waste cardboard, paper and natural textiles**  
Where possible, these are best dealt with through separate collection for recycling. Recycling saves energy and climate emissions compared to incineration, and reduces raw material extraction. (see briefing ‘Recycling – why it’s important and how to do it’ [www.foe.co.uk/resource/briefings/recycling.pdf](http://www.foe.co.uk/resource/briefings/recycling.pdf))  
If they are too contaminated for recycling, AD is an alternative treatment.
- **Agricultural waste**  
This waste is suitable for treatment by AD. Some of the agricultural materials discussed above are also legally waste streams (and would be classified as agricultural waste).

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- **Sewage sludge**

This should be processed through AD where possible.

### Waste streams mixed with fossil fuel derived CO<sub>2</sub>

- Residual municipal waste
- Residual commercial and industrial waste

These waste streams contain a mixture of fossil-fuel derived materials (e.g. plastics) and biological materials. These waste streams are not suitable for treatment by thermal processes, as burning carbon sourced from fossil fuels produces fuel-derived carbon dioxide, which is the main cause of climate change. Mixed wastes are also more likely to produce problematic emissions if burnt.

### Waste - technologies and input types

#### Incineration

Studies have clearly shown that incineration is not a climate-friendly treatment technology, even if it generates energy by combined heat and power (CHP). Incinerators generate inefficiently, producing more greenhouse gases than gas-fired power stations.

Incinerators burn a mixture of fossil-fuel derived materials (e.g. plastics) and biological materials. The Waste Strategy for England states: “Where fossil fuel based products are incinerated (e.g. plastics) they tend to generate energy less efficiently than using fossil fuel directly, hence are associated with an overall carbon cost”. This means that incinerators release a large amount of CO<sub>2</sub> to produce a small amount of energy. A waste to electricity incinerator actually releases 33 per cent more fossil-fuel derived CO<sub>2</sub> per unit energy produced than a gas-fired power station. If heat from the incinerator is used, then performance is similar to a gas-fired power station.

#### Briefings

See Eunomia Consultants for Friends of the Earth, 2006, “A changing climate for energy from waste?” [www.foe.co.uk/resource/reports/changing\\_climate.pdf](http://www.foe.co.uk/resource/reports/changing_climate.pdf).

The research is summarised in the “Dirty Truths briefing at:

[http://www.foe.co.uk/resource/briefings/dirty\\_truths.pdf](http://www.foe.co.uk/resource/briefings/dirty_truths.pdf)

For more information on incineration, see the “Up in Smoke” briefing at:

[http://www.foe.co.uk/resource/media\\_briefing/up\\_in\\_smoke.pdf](http://www.foe.co.uk/resource/media_briefing/up_in_smoke.pdf)

Although many companies proposing incinerators claim that they will try to capture more energy by providing heating through hot water to nearby offices or homes, the district heating component is often not implemented.

The lack of flexibility of incineration damages recycling rates. Incinerators with long contracts actively compete with recycling for materials, and are a barrier to waste prevention. This is a particular issue in countries like the UK where incinerators are operated by private companies with long contracts (25-60 years) which demand fixed tonnages of waste. This ‘crowding out’ is apparent from recent data from Denmark, Germany and Hampshire. For example, regional data for household waste from Denmark in 2005 clearly shows that regions with high incineration have lower recycling and regions with lower incineration do more recycling.

**The sustainable alternative.** Eunomia’s report “A changing climate for energy from waste?” shows that pre-treatment of residual waste to remove recyclables and degrade biodegradable materials (mechanical biological treatment or MBT), followed by landfill of the end material, is

### **Getting serious about local low-carbon and renewable energy**

better for the climate than incineration, with or without recovery of heat. MBT should not be used to produce refuse derived fuel (RDF) to be burnt elsewhere.

#### **‘New technologies’ / advanced thermal treatment (ATT)**

‘New technologies’ / advanced thermal treatment (ATT) include pyrolysis, gasification and plasma technologies. These are thermal processes that use high temperatures to break down waste.

Pyrolysis and gasification of municipal waste has the potential to be more flexible than incineration because it can be more modular. They may have some advantages in terms of emissions, although firm conclusions are impossible to draw because toxicity is notoriously difficult to measure. They typically rely on carbon-based waste such as paper, petroleum-based wastes like plastics, and organic materials such as food scraps. Increasing re-use, recycling and composting will dramatically alter the level of these waste streams in residual waste, and may therefore compromise the ability of pyrolysis and gasification plants to operate profitably.

These processes will release fossil-fuel derived CO<sub>2</sub> from plastics, synthetic textiles etc, as well as biologically-derived CO<sub>2</sub> from biological materials. Therefore these are not 100 per cent renewable energy technologies, and analysis has shown that it can be better in climate terms to landfill stabilised waste than to burn it, even with the claimed efficiencies of these technologies.

There is a lack of independent data to demonstrate how well these technologies perform, so they cannot be compared to alternative treatment technologies in terms of overall impact on the climate, overall energy balance or financial viability. Most local authorities are still not maximising recycling and composting. While this is the case, using pyrolysis and gasification will undermine recycling and composting – which are far better ways of saving energy and resources;

#### **Briefing**

‘Pyrolysis, gasification and plasma’:

[www.foe.co.uk/resource/briefings/gasification\\_pyrolysis.pdf](http://www.foe.co.uk/resource/briefings/gasification_pyrolysis.pdf)

#### **Anaerobic digestion**

Friends of the Earth supports the development of anaerobic digestion for provision of renewable energy. Anaerobic digestion (AD) is a treatment that composts biodegradable waste in the absence of oxygen, producing a biogas that can be used to generate electricity and heat. Almost any organic material can be processed with AD, including waste paper and cardboard (which is of too low a grade to recycle, e.g. because of food contamination), grass clippings, leftover food, industrial effluents, sewage and animal waste.

AD generates 100 per cent renewable energy exclusively from the biomass portion of waste, and is the best treatment for food waste and other appropriate unrecyclable biodegradable waste in terms of climate change. Where possible, waste streams should be separated at source so the residue remaining after processing is clean enough to be used as a soil conditioner.

We support the use of agricultural wastes in anaerobic digestion. However, we are concerned that AD plants could become over-dependent on inputs from intensive farming systems. It is therefore important to ensure that AD plants are not oversized such that they would create a demand for less sustainable farming systems, eg by specifying that AD facilities are localised, using local farm waste for local use (ie farm/village/community use).

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**Mechanical biological treatment.** AD can also be combined with mechanical sorting systems to process residual mixed municipal waste (mechanical biological treatment or MBT). After recyclable and compostable materials have been separated from the waste stream, MBT is the best way to treat the remaining waste in terms of the environment, and in particular climate change (See Eunomia Consultants for Friends of the Earth, 2006, “A changing climate for energy from waste?”, [www.foe.co.uk/resource/reports/changing\\_climate.pdf](http://www.foe.co.uk/resource/reports/changing_climate.pdf).)

If there is a big push on AD (including separate collection of food waste), then there will be less biological carbon in residual waste, so increasing the fossil CO<sub>2</sub> % of any residual waste burning technology.

#### **Briefings**

Mechanical Biological Treatment: [www.foe.co.uk/resource/briefings/mchnical\\_biolo\\_treatmnt.pdf](http://www.foe.co.uk/resource/briefings/mchnical_biolo_treatmnt.pdf)

Anaerobic Digestion: [www.foe.co.uk/resource/briefings/anaerobic\\_digestion.pdf](http://www.foe.co.uk/resource/briefings/anaerobic_digestion.pdf)

#### **Energy Crops**

Friends of the Earth recognises the potential of energy crops, but is concerned by increasing and competing demands for global land use, particularly the importance of ensuring global food security, and the need to reduce the energy dependency of the food chain and re-localise food systems. Biofuels have been identified by the World Bank, IMF and several international institutions as a key cause of the current food crisis by increasing demand for crops such as grain and corn and increasing competition for land between food and fuel.

Calculations on the greenhouse gas savings or climate impact of bioenergy crops need to take into account not only direct emissions (for example from land clearance, production, fertiliser use, transportation) but also indirect emissions. These indirect emissions occur if existing agricultural land is used to grow bioenergy crops. Demand for the original crop that is displaced (or an alternative crop that will meet a similar need, eg a food oil) remains the same and so production of this crop will move to other land. This could be new land cleared from grassland or forest.

This indirect land use change (ILUC) is very difficult to measure and even more difficult to avoid. The EU is currently discussing how to account for greenhouse gas emissions from ILUC but no methodology has yet been chosen.

**Energy crops in the UK.** Currently the area of crops in the UK specifically grown for energy is small. For these crops to play a major role in meeting our energy needs would require a massive increase in land area with important implications for other land uses in the UK. Friends of the Earth is concerned that the Government is developing targets for bioenergy production, and offering incentives to farmers (under the Energy Crops Scheme) without fully assessing the implications for other land uses notably food production. Although the Government claims that its targets for energy crops can be met without impacting on food production this must be seen in the context of a food security policy which fails to address the need to reduce our reliance on imported animal feeds and continues to promote GM crops as a solution.

The UK requires a huge amount of overseas land to feed our own consumption including a significant quantity of land used to produce soy to feed UK livestock. Deforestation to clear land for soy production is a significant source of GHG emissions. The UK should be aiming to increase food production to increase food self sufficiency, including an increase in home grown animal feeds. It will not be possible to grow enough animal feed in the UK to replace all imported soy so a reduction in livestock consumption and production is fundamental to a sustainable use of land.

Friends of the Earth believes food production must be the primary aim of sustainable land use policy, and the following priority order should apply to the use of land suitable for agriculture:

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- Food crops for human consumption
- Feed crops for UK livestock (under a scenario of reduced meat and dairy consumption)
- Energy crops

Friends of the Earth believes that a review of the land allocations for bioenergy production is needed, to be informed by a rigorous assessment of the implications on capacity for food production (including livestock feeds) and UK and global food security. The review of land use capacity should assume the most sustainable method of production of bioenergy crops including the potential for mixed farming systems and low input methods of production.

There is also potential for crops to serve dual purposes where animal feed is produced as a by product of energy crop production. This could increase the potential for energy crop production in the UK at the same time as helping to replace imported soy for animal feed with home grown feeds. This is being promoted by companies with an interest in bioenergy crops but independent research is needed to assess the suitability of these co-products for livestock and processing capacity would need to be provided.

For both dual purpose crops and crops for energy use alone Friends of the Earth believes that preference should be given to local production for local use (eg on farm, within a village/community). This would reduce the need for long distance transport of energy crops for processing. Small scale production for local use is also less likely to result in massive areas of monoculture cropping which rely on high inputs. In particular the potential for rotations with food crops in a mixed farming system should be assessed. Farm diversification to serve local renewable energy markets could have rural economic benefits if in line with a sustainable biomass hierarchy, localised supply chains and the over-riding priority of land use for food production.

Where land is deemed suitable for bio energy crops in line with the hierarchy set out above, the method of production will be equally important in determining whether there is a positive outcome for biodiversity and GHG emissions. Vast areas of monoculture production of energy crops will depend on high levels of inputs which themselves have high energy requirements. Priority should be given to crops with the best energy balance (ie not those that require oil based inputs of fertilizer and pesticides). High inputs of pesticides and fertilizers also lead to pollution and damage to biodiversity. Although best practice guidance has been developed by DEFRA for the Energy Crops Scheme this allows for the application of pesticides and fertilizers without any assessment of the energy balance, and it fails to consider the former biodiversity value of the land.

### **Following an assessment of the land availability for energy crops the following environmental criteria should be used to assess individual proposals for energy crops to be grown in the UK:**

- The crops and method of production should build soil structure and fertility and conserve water quantity and quality;
- The use of agrochemicals and artificial fertilizers must be minimised
- There must be no development or release of GM crops or trees into the environment
- The crops and method of production must not reduce biodiversity compared to the existing use of that land and must not be located in areas of high biodiversity value such as wetlands or extensively managed semi-natural grassland
- The energy crop must contribute to significant greenhouse gas emissions reductions of at least 60% across the full life-cycle of production (including land use change, production, refining, waste disposal, transport and use).

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**Independent research should be carried out into the potential for dual purpose crops for energy and animal feed production.** This should include an assessment of the potential for local processing to supply farms with animal feed

A number of specific crops may be suitable for production in the UK. More research is needed to identify which crops will be best suited to low input production.

### **Short rotation coppice (willow/poplar)**

Short rotation coppice systems are densely planted high-yielding varieties of willow and poplar that are harvested in 2 – 5 years cycles. Short rotation systems can lead to increases in Soil Organic Carbon sequestration in comparison with other agricultural uses although this depends on the previous use of the land. SRC plantations have a high water requirement. During establishment there can be a high reliance on pesticides which may continue in monoculture plantations but can be avoided if a mix of willow varieties is planted. In upland areas fertilizers will be needed. The production of agrochemicals requires significant quantities of energy and fossil fuels which must be taken into account in assessing any GHG savings. Biodiversity impacts will depend on the crop that is displaced by the SRC plantation. Extensive root systems and reduced tillage can help to reduce soil erosion.

Genetic modification of trees such as poplar as feedstocks for cellulosic ethanol has been proposed but this carries a high risk of gene escape because tree pollen and seeds can move long distances. GeneWatch UK warns that “As trees are essentially undomesticated, the spread of GM traits into wild populations is much more of a risk than for crop plants”.

### **Eucalyptus**

Eucalyptus is used in Short Rotation Forestry systems but at present there is limited information on the impacts on biodiversity and natural resources. Preliminary research by the Forestry Commission has shown that eucalyptus plantations have possible negative visual, biodiversity and hydrological impacts (see

[http://www.forestry.gov.uk/pdf/SRFFinalReport27Feb.pdf/\\$FILE/SRFFinalReport27Feb.pdf](http://www.forestry.gov.uk/pdf/SRFFinalReport27Feb.pdf/$FILE/SRFFinalReport27Feb.pdf)

The FC are also conducting short rotation forestry trials <http://www.forestry.gov.uk/srf> ).

### **Miscanthus**

Miscanthus is a woody grass with a deep root structure. Soil Organic Carbon sequestration potential is limited, and as with SRC the application of agrochemicals, their associated energy requirements, and demands on water resources can have negative environmental impacts especially during establishment of the crop.

There has been little research into the impact of mature stands of perennial crops such as miscanthus on biodiversity. However miscanthus is a highly invasive species and widespread growing could lead to biodiversity impacts due to the loss of other plants. Its deep-rooted structure also makes it difficult to rehabilitate and use land for other crops. An environmental risk assessment should be carried out prior to widespread commercial production, and the Advisory Committee on Releases to the Environment (ACRE) should investigate what the risks are.

To encourage high biodiversity, plantations should be interspersed with other farmland habitats.

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### **Biomass Imports**

Imported energy crops may create a number of additional negative impacts including deforestation, biodiversity loss, land rights, worker conditions, etc. Agrofuels have been found to be particularly problematic, and due to the complicated and multiple impacts of agrofuel crops, Friends of the Earth is calling for:

- A moratorium on imports of agrofuels into the EU and on subsidies that encourage the development and large scale production of agrofuels.
- This moratorium should remain until mandatory carbon and sustainability standards are in place which empower communities to use their natural resources sustainably, guarantee carbon savings of at least 60%, and do not lead to adverse environmental or social impacts either directly or indirectly through shifting problems elsewhere.

### **Combined Heat and Power (CHP).**

Combined heat and power (CHP) is not a 'renewable' energy technology (unless biomass or AD-generated gas is burnt) but an efficient method of generating electricity which simultaneously captures the heat created for use by industry and business, or to provide hot water and central heating for homes. Traditional electricity generation disposes of this valuable heat resource as a waste product - as witnessed by the huge cooling towers visible at large power plants. The heat generated by CHP can be used in the same location, or can be shared with adjoining homes, offices and industrial sites via an underground system of highly insulated pipes, known as a district heating network.

CHP is a highly effective method of energy production, achieving efficiencies of 80% or more. CHP optimises fuel use – whether that fuel is coal, gas, oil or biomass – considerably reducing the amount of fuel required. It also renders the traditional dedicated on-site boiler redundant. This means CHP can offer significant cuts in CO<sub>2</sub> emissions, and is an essential component of a sustainable future energy system.

While electricity can be transported over hundreds of miles with only small losses through high voltage cables, heat needs to be used relatively close to its site of production (though heat grids in Denmark can carry heat 20 miles or more). CHP plants sited near to end users offer the most effective method of heat transfer as the short distance the heat has to travel reduces energy loss during transmission. As a consequence, to make the best use of CHP, it is important to understand where heat is required, and if possible co-locate electricity generation with heat demand.

There is a growing acceptance of the need to apply CHP technology to large scale generation. The Institute of Civil Engineers has recently proposed that Government should commission feasibility studies into capturing heat and creating district heating networks at Drax, Ferrybridge and Eggborough, and Tilbury-Kingsnorth. They also urge that the assessment of heat capture potential should become a planning condition on all new power stations

[http://www.ice.org.uk/downloads/heat\\_report.pdf](http://www.ice.org.uk/downloads/heat_report.pdf)

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<sup>i</sup> Section 11 of the Local Government Act 1976 empowers local authorities to lay heat networks and develop district heating schemes and produce electricity and heat, but not to sell electricity which is produced otherwise than in association with heat. This means that under current legislation a local authority could not sell electricity from a wind or solar system, and makes it difficult for a local authority to participate in a company which carries on such an activity. The Government has announced its intention to remove this restriction in the recently published Renewable

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Energy Strategy. Additional regulations apply to the generation and supply of electricity, and use of distribution networks, under the Electricity Act 1989. Different rules apply to the use of public wires (the existing electricity distribution system – where a 'use of system' charge would be payable to the distribution network operator) and private wires (eg a local authority might choose to buy some of the existing electricity network, or build their own to supply their own estate). While generators below 50MW are exempted from the requirement for a generation licence, exemption from a supply licence only applies to generators supplying less than 5MW over public wires, and must not exceed 2.5MW to domestic consumers. For supply via private wires, a lower 1MW limit applies to domestic consumers. The effect of this regulation is to impose a limit on the size of infrastructure projects which local authorities might consider.