



BIOGAS REGIONS

Regional Strategy and Action Plan for the “SWEA” Region of the UK

A report by Severn Wye Energy Agency Ltd with input from the
Advisory Group for the Biogas Regions Project in England and
Wales

Intelligent Energy  Europe

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Executive Summary

The potential for biogas production in the region (Wiltshire, Gloucestershire, Monmouthshire and Powys) is significant with the key annual statistics estimated as:-

- 126,000 tonnes of potentially collectable food waste
- approximately 350 dairy units with at least 100 cattle
- around 70 units with 200 or more pigs
- 9 units with 100,000 poultry or more in Wiltshire alone.
- very specific opportunities arising from the food processing industry

It is seen as being vitally important that the biogas industry in the region is established on the basis of some really good installations that work well for their operators, solve environmental problems rather than create them and are excellent case studies for others to follow. The key objectives of this Strategy are:-

- The establishment of best practice utilisation of liquid and solid digestate
- The efficient utilisation of the biogas fuel with the minimum of waste
- The diversion of food or food-processing waste (including the acceptable fraction of abattoir waste) away from incineration or landfill.
- The diversion of appropriate non-lignacious biodegradable waste away from centralised aerobic composting schemes, incineration or landfill.
- The diversion of manures, particularly from intensive livestock operations into biogas plants
- The development of cooperative ventures
- The development of a skilled and well-trained workforce
- Increased competitiveness of the food processing sector

The key objectives will be met by:-

- Increasing the profile of biogas technology and its potential contribution to waste management problems in particular
- Providing information to decision-makers, particularly planning officers and councillors
- Seeking out opportunities for AD developments
- Influencing the development of projects in order to increase viability, enhancement of sustainable development principles, maximisation of opportunities for cooperative action and the implementation of high quality installations.
- Dissemination of best-practice solutions from within the UK and the EU in general.

1. Introduction

1.1 The objective of the regional strategy and action plan is to determine the technical potential for the production of biogas, to identify the barriers and obstacles in the specific region and country and to elaborate a strategy for a successful development of biogas production. The study of the potential will be based on already available data (to the extent that it exists) and expert estimations. The sectors concerned are: waste from agriculture and its effluents, energy crops (eg. maize and grass), organic waste from the municipal waste stream (green waste and food waste) and the waste from food processing industries.

A key component of strategy development has involved an examination of the legislative framework, economic drivers, public perception and other potential obstacles and barriers. What follows is, in large measure, a response to those perceived barriers and obstacles but it is also a reaction to newly evolving opportunities that are arising at this time. Whilst the Biogas Regions project comes at an opportune moment to take advantage of the changing attitudes in the UK towards anaerobic digestion technology, this comes at the cost of a strategy such as this becoming quickly out-dated.

The strategy sets out objectives for the medium and long term period and proposes measures to improve the viability of biogas projects. The strategy development has benefited from the involvement of the experienced partners from Austria and Germany where biogas developments are common-place.

2. The Region

The UK “region” to which this programme applies is split between the SW England counties of Gloucestershire and Wiltshire, and the Welsh counties of Powys and Monmouthshire. The total population of the project area is approximately 1.34 million people with an area of 12,191 sq km.

The English and Welsh areas are approximately equal in size but the Welsh counties are by far the more sparsely populated. The average population density for Powys and Monmouthshire is 35.2 people per sq. km. with the equivalent figure for Gloucestershire and Wiltshire being 164.2.

The Welsh region is largely upland in character with agricultural production dominated by extensive sheep rearing. The English region has a much higher concentration of arable land and intensive livestock production.

3. The Potential for Biogas Production

3.1 Food Waste from the Municipal Waste Stream

Accurate figures are not available so it has been estimated using a figure of 20% of total arising as being food waste, and 70% as being the recovery rate. This gives figures of :-

- 5,800 tonnes for Monmouthshire
- 9,150 tonnes for Powys
- 33,600 tonnes for Gloucestershire
- 27,800 tonnes for Wiltshire

3.2 Commercial/Industrial – “municipal-like” stream

This stream is from premises such as shops, offices and is not primary manufacture or food processing industry. This stream is very similar in content to the municipal stream and similar correctional estimates have been used to provide the following figures of potential AD feedstock:-

- 3,800 tonnes for Monmouthshire
- 5,900 tonnes for Powys
- 21,800 tonnes for Gloucestershire
- 18,100 tonnes for Wiltshire

3.3 Commercial/Industrial – residual.

This stream is very specific to the industrial sector. There are a number of major food producers/processors in the Gloucestershire area in particular.

3.4 Agricultural Sector

There is a huge theoretical potential for slurry, other wastes and crops, particularly in the Monmouthshire and English part of the region. Whilst there is scope for cooperation between farmers, experience tends to suggest that the development of slurry based AD plants is on large holdings with at least 100 livestock units (NB 1 livestock unit (LSU) = 1 cow = 5 sheep). The livestock need to be kept in conditions that mean that their manure is practically collectable thus, for instance, militating against units with large sheep flocks which are in fields or open hill for the majority of the time.

The most recent statistics that are publicly available relate to 2006 and these suggest that there are 103 dairy units with at least 100 cows in Gloucestershire, approximately 135 in Wiltshire, 79 in Powys and 96 in South Wales (of which Monmouthshire will contribute a significant proportion). There are as many as 170 beef units with more than 100 cattle in the herd over the region but few of these will be intensive units where the cattle spend a significant time in buildings.

There are 54 holdings in Wiltshire where 200 or more pigs are kept, with another 10 or so in Gloucestershire. There are very few large pig units in Wales, let alone Monmouthshire and Powys. There are number of poultry units of various sizes spread across the region but

the greatest opportunity appears to be in Wiltshire where there are 9 units which have over 100,000 birds each.

There may be considerable scope to consider locations where feedstock is available from mixed species (eg dairy with poultry waste). This has a number of advantages particularly those relating to the year-round availability of feedstock and the need to control the nutrient content and balance of useable digestate.

4. Possible Uses of Biogas Produced

The full-range of options is available within the region for the utilisation of biogas and it is known that all, to one extent or another, are under active consideration. The utilisation via its injection into the gas network is currently financially unattractive due to high capital costs and the lack of any tariff incentive for renewable gas.

The most likely utilisation is still likely to be the generation of electricity via an engine or turbine and it is a significant objective of this project to increase the extent to which the “waste” heat is productively used. This objective is also hindered through the lack of any tariff incentive for renewable heat.

Utilisation of the gas as fuel for road vehicles (particularly captive fleets) is an option that is reasonably likely to be adopted in a minority of cases.

5. Obstacles and Barriers

5.1 In order to develop, the biogas industry needs to overcome several barriers to progress:-

- **Economic Viability.** The technology is perceived as being extremely expensive and uneconomic.
- **Public/Industry Perception.** Anaerobic digestion is commonly understood to be a technology that is only about manure and sewage. This perception is particularly unhelpful given the energy yield from such feedstocks.
- **Bad Neighbour Development.** This point is probably linked to the point above and that involve particularly smelly feedstocks. It is assumed by many, including regulators, that AD plant will always give rise to odour complaint and should be sited a very long way from sensitive properties.
- **Limited Expertise in the UK.** There are competent individuals in consultancies, academic institutions and companies that design, install and operate AD plant but they are relatively few in number. It is encouraging that these people tend to be very busy but there are too few of them and the development of the industry will be restricted by their ability to deliver.
- **Institutional and Regulatory Issues.** The technology is generally not well-understood in government (central and local) and thus its potential has been consistently under-estimated for many years. There are signs that this is changing but there is much to do in this area. The UK environmental regulator has (despite pressure from industry and NGOs to agree to a digestate protocol) adopted policies that restrict investment and disincentivise the best economic environmental options.

6. The Strategy

6.1 Broad Strategic Objectives

There are a number of guiding principles and core objectives that underpin the strategy and define the reason for its development and the desire to see biogas developments implemented in the region:-

- Emissions of greenhouse gases (particularly methane) are very significantly reduced via the pre-treatment or diversion of organic waste from landfill sites
- Emissions of greenhouse gases are reduced through the efficient and productive utilisation of biogas in substitution for fossil fuels.
- Emissions of greenhouse gases and the consumption of fossil fuels are reduced through the substitution of mineral (NPK) fertilisers with high quality AD digestate
- Energy security issues are eased through the generation of indigenous fuels
- The incidence of surface and groundwater pollution from organic wastes is significantly reduced through the comprehensive treatment options afforded by this technology
- The creation of additional wealth, particularly in the rural economy

6.2 More Detailed, and Quantifiable Objectives

6.2.1 Anaerobic digestion provides the region with opportunities that are currently very significantly under-utilised. The objective would be to see the technology used to its optimal potential although it is recognised that this is probably achieved best through a steady growth in reliable good practice examples. Particularly given the nature of this industry, it is considered to be desirable that early developments are of the highest possible standards, in order that they generate confidence in the technology and processes.

6.2.2 The objectives in this period of establishment are:-

- The establishment of best practice utilisation of liquid and solid digestate, minimising ground and surface water pollution, with excellent uptake by plants, minimal air pollution, low odours and maximum displacement of artificial fertiliser use.
- The efficient utilisation of the biogas fuel with the minimum of waste (usually in the form of heat). Where electricity generation is involved this would suggest that co-generation (combined heat and power (CHP)) would be the norm.
- The diversion of food or food-processing waste (including the acceptable fraction of abattoir waste) away from incineration or landfill.

- The diversion of appropriate non-lignacious biodegradable waste away from centralised aerobic composting schemes, incineration or landfill.
- The diversion of manures, particularly from intensive livestock operations, away from land-spreading (which is currently the norm but subject to tightening rules), combustion or other environmentally damaging or non-productive disposal routes.
- The development of cooperative ventures that ensure that biogas plants are utilising a feedstock mix that provides good gas yields, high levels of consistency of operation whilst minimising the distance through which inputs must travel.
- The development of a skilled and well-trained workforce in the construction, maintenance and operation of biogas plants.
- Increased competitiveness of food processing sector through the reduction of waste processing/disposal costs.

6.2.3 The extent to which the UK market is ready and/or the direction taken by UK energy/agricultural policy will encourage, the development of biogas production based upon specifically grown crops is questionable. This report is being prepared at a time of unprecedented volatility in agricultural prices, particularly of the starchy grains that are commonly used in AD in other EU member states. Public concerns have been expressed on the impact of demand for first generation biofuels on prices, with widely differing estimates of the actual outcome. However, the 2007 increase in corn prices led to an immediate worldwide production response which has driven down harvest 2008 prices to close to 2006 levels. Provided each case is treated on its merits, there will be a place for augmenting manures with high gas yielding energy crops in a proportion of on-farm systems.

6.3 Likelihood of Achieving Objectives

6.3.1 There are a number of factors that are likely to limit the achievement of strategy objectives:-

- Lack of delivery of the emerging strategy at central, regional and local government level
- Failure to recognise the full role of AD in waste strategy and delivery
- Insufficient fiscal incentive to encourage the development of AD
- Over-cautious environmental regulation
- No recognition in public support mechanisms for carbon displaced by the production and use of renewable heat
- Lack of a framework to enable the delivery of renewable heat through local heat networks
- Insufficient knowledge of the potential of AD at almost all levels of government, industry and society in general
- Public perception of the technology (to the extent that there is any knowledge at all), fear of the unknown and the in-built resistance to change

- The UK seems to favour large-scale solutions which do not lend themselves to the efficient utilisation of “waste” heat. There is also a lack of familiarity and embedded mistrust of district heating solutions.

6.3.2 Energy-from-Waste combustion plants have been constructed or are planned in many areas and long-term contracts are in place to treat waste from a wide area. Similarly, centralised aerobic composting schemes have been developed over recent years and there is considerable inertia in the system that will take quite some reversing. This is a potential threat as many EfW plants will operate systems that incinerate the entire biological fraction, denying opportunities for better environmental outcomes. Worse, under Private Financing Initiatives, waste authorities are writing very long-term (25 year) contracts to put such facilities in place.

6.4 Strategy Implementation

6.4.1 Whilst many of the barriers cannot be over-come other than at the level of national government there are issues that can be addressed at the regional level.

6.4.2 The issues that can be addressed at regional level and by the partners involved in this project are:-

- Increasing the profile of biogas technology and its potential contribution to waste management problems in particular
- Providing information to decision-makers, particularly waste policy officers, planning officers and councillors
- Seeking out opportunities for AD developments
- Influencing the development of projects in order to increase viability, enhancement of sustainable development principles, maximisation of opportunities for cooperative action and the implementation of high quality installations.
- Dissemination of best-practice solutions from within the UK and the EU in general.

6.5 The Information Campaign

6.5.1 It is key to success for the development of biogas in the region that publicity and information are available and distributed to decision makers and the public at large. This information will be targeted primarily at local planning authorities and will include, where appropriate, representations being submitted in respect of individual planning applications.

6.5.2 A dissemination and publicity campaign will be implemented that involves appropriate literature, seminars, attendance at public events, media reports and publicity.

6.5.3 There will be a separate strategy for potential investors and feedstock providers and this will include the opportunity to visit biogas plants in the UK and, probably elsewhere within the EU (Germany?).

7. Proposed Action Plan

7.0 The Action Plan consists of a series of discreet but inter-related actions that, in sum total, are designed to achieve the objectives of the Regional Strategy. Each of the actions is described more fully on the implementation sheets contained within the annex to this document.

7.1 Expanding SWEA knowledge base

7.2 Influencing Policy Makers

7.3 Informing Regulators

7.4 Raising Awareness Amongst Potential Developers

7.5 Providing Study Tour Opportunity(ies)

7.6 Providing Best Practice Case Studies

7.7 Disseminating Up-to-date Information

7.8 Assisting Potential Developers to Assess Project Viability

7.9 Providing Practical Assistance in Improving the Quality of Potential Schemes

7.10 Providing Assistance in Partner searches, for instance, in terms of potential heat users or feedstock providers.

7.11 Providing Advice to Potential Developers in Navigating the Town and Country Planning system.

7.12 Providing Assistance with Technology Availability and the Potential Suppliers of Equipment and Expertise.

8. Implementation

8.1 Severn Wye Energy Agency is unable to implement the Action Plan without the active involvement of other parties and it is very much part of the concept of “Biogas Regions” in the UK context that it complements the work of others and does not seek to duplicate or cut across measures already underway or planned.

8.2 In the Welsh context this complementary role has led to SWEA being linked to the Centre of Excellence for Anaerobic Digestion that has been established at the University of Glamorgan.

8.3 The Regional Advisory Committee has played a key role in the development of this strategy and action plan and will provide support and advice to SWEA staff in its implementation.

8.4 There have been many others organisations and individuals that have helped shape this document, including the other partners in “Biogas Regions” and there will be many others needed to see it implemented successfully.

8.5 Details of the method of implementation and the likely key players are highlighted in the numbered actions included in the annex.

9. Monitoring

9.1 The Action Plan will be re-assessed by the Advisory Committee in the Spring of 2009 and again in early 2010 in order to assess progress against targets. If revisions in the strategy or a change of emphasis is required at any stage then these will be considered and, if appropriate, implemented.

9.2 The context of the Action Plan is one where oil has moved to well over \$100 a barrel and governments across the world are being forced to react to these, almost certainly permanent, changes to way society views energy. This enforced change, along with the desirable change required in order to reduce the extent of climate change, will see more radical policies emerging from government and more dynamic solutions implemented by businesses. Whilst these changes represent an opportunity for biogas technology, they also mean that strategies such as this need to be able to react quickly.

10. The Advisory Group

10.1 An Advisory Group was established to assist with the development of the Biogas Regions project in the SWEA region of England and Wales. The Group assisted with the preparation of this document and will assist with the implementation of its contents. Its current membership is:-

Richard Baines – Royal Agricultural College, Kevin Austin– Welsh Assembly Government

Mark Brown – Powys County Council, Richard Dinsdale – University of Glamorgan

Sandra Esteves – University of Glamorgan, Adrian Jones – Welsh Assembly Government

Lucy Lewis – BiogenGreenfinch Ltd, Lisa Pritchard – Gloucestershire County Council

Steve Rist – Merlin Biofuels Ltd, Sue Thompson – Glasu

David Williams – Potters Ltd, Kierson Wise – Severn Wye Energy Agency

Christopher Maltin – Organic Power Ltd, Guy Hitchcock – Sustainable Transport Network

Lisa Pritchard – Gloucestershire County Council, Simon Dawes – Environment Agency

Tim Patterson – University of Glamorgan, Paul Roberts – Wales Environment Trust

David Saunders – Organic Power Partnerships

Oliver Harwood – Country Land and Business Association (CLA)

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