Environment and Sustainability Committee

Meeting Venue:
Committee Room 3 – Senedd

Meeting date:
1 March 2012

Meeting time:
09:30

Cynulliad Cenedlaethol Cymru
National Assembly for Wales

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Agenda

1. Introductions, apologies and substitutions

2. Inquiry into energy policy and planning in Wales – Evidence on anaerobic digestion and energy from waste (09.30 – 10.30) (Pages 1 – 35)

Dr Sandra Esteves, Director, Wales Centre of Excellence for Anaerobic Digestion, University of Glamorgan
E&S(4)-09-12 paper 1
Clifford Parish, Chair, Chartered Institution of Wastes Management Wales
E&S(4)-09-12 paper 2

3. Inquiry into energy policy and planning in Wales – Evidence on biomass (10.30 – 11.30) (Pages 36 – 43)

Kath McNulty, National Manager for Wales, Confederation of Forest Industries (Confor)
Darren Williams, Commercial Director, Eco2
E&S(4)-09-12 paper 3

4. Draft Contaminated Land Statutory Guidance (11.30 – 11.45) (Pages 44 – 49)

E&S(4)-09-12 paper 5

5. Papers to note (Pages 50 – 53)

Minutes of the meetings held on 9 and 22 February
E&S(4)-07-12 minutes

E&S(4)-08-12 minutes

5a. Inquiry into the Business Case for the Single Environmental Body - Additional information from the Minister for Environment and Sustainable Development (Pages 54 - 57)
E&S(4)-09-12 paper 4

Environment and Sustainability Committee

E&S(4)-09-12 paper 1

Inquiry into energy policy and planning in Wales – Evidence from Dr Sandra Esteves, Wales Centre of Excellence for Anaerobic Digestion, University of Glamorgan

Written Evidence To Be Considered As Part of the Inquiry Into Energy Policy and Planning in Wales

Anaerobic Digestion in Wales

Written by

Dr. Sandra Esteves

17th February 2012

Wales Centre of Excellence for Anaerobic Digestion

University of Glamorgan

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1.0 BRIEF INTRODUCTION TO THE WALES CENTRE OF EXCELLENCE FOR ANAEROBIC DIGESTION

The Wales Centre of Excellence for Anaerobic Digestion based at the Sustainable Environment Research Centre at the University of Glamorgan was established in 2008, largely as a response to the recognition of anaerobic digestion (AD) as the preferred technology for treating and recycling municipal source segregated food waste, and that expert technical input was required to assist with the development of an appropriate waste treatment infrastructure. The Centre's overall aim is to facilitate the development of a robust AD infrastructure in Wales, to foster innovative solutions that maximise the environmental and economic benefits of the process and products, and to encourage long term growth of the AD and biogas industry. To do this the Centre acts as a process development and deployment support platform and delivers industrial focused R&D, feedstock and digestate analysis, system design, monitoring and diagnostics, support for policy and regulation definition, provision of general support and guidance for a number of stakeholders and awareness raising, training and knowledge transfer among other activities. The centre also provides direct support and funding for innovation within the AD and biogas sectors. The AD Centre has been funded by the Welsh (Assembly) Government (WG), the European Regional Development Fund (ERDF) and the University of Glamorgan.

The Centre currently employs:

- Centre's director (70% Full time Equivalent),
- Business and Information Manager (100% Full Time Equivalent),
- Laboratory officer (100% Full Time Equivalent)
- Technical adviser (100% Full Time Equivalent)
- Administration officer (60% Full Time Equivalent)

The two funding streams have allowed the delivery of complementary activities with a special emphasis on support provided on a whole Wales basis for local authorities, policy makers, regulators and enterprises from the WG funding stream. ERDF funding has allowed the delivery of support to Convergence based enterprises and the generation of jobs, as well as the provision of grants for eligible SMEs for the development of new or improved processes, products or services related to the AD and biogas sectors.

The Centre has provided support to the Welsh Government, Local Authorities and other stakeholders with the implementation of the ongoing waste infrastructure procurement programme. Strategic work undertaken by the Centre also includes the initial assessment of anaerobic biodegradability of a variety of bioplastics (relevant to food waste collection liners) and an investigation of the characteristics of a range of digestates and their influence on dewatering (relevant for final disposal, utilisation and recycling of digestates).

One of the Centre's core activities under both the WG and ERDF programme is the dissemination of technical and non technical information. The Centre's intention on this front has been to always provide technically accurate and technology independent information to all stakeholders, and this continues to be the case. As such the Centre has organised and delivered a range of dissemination events (Appendix A) and presented at a large number of events organised by third parties (only recent examples are listed in Appendix B).

The Centre has developed a comprehensive website (www.walesadcentre.org.uk), which provides a wide range of information relating to the AD industry in Wales and the UK. This includes case studies from AD plants across Europe as well as a summary of the technical and legislative frameworks within which the AD industry must operate. The development and launch of our Suppliers Database in late 2010 was a significant achievement and the database has surpassed our expectations. We currently have the profiles for over 240 companies involved in the AD and biogas supply chain on line and their information is available for all registered users to search. The website currently receives around 500 individual users each month, primarily from the UK, but also from continental Europe, the USA, Canada, India and China. 65 No. enquiries have been received via our 'Ask the Experts' facility and all enquiries have received a reply. Many others reach us on daily basis directly by phone or email.

The Wales Centre of Excellence for Anaerobic Digestion has had direct interaction (i.e. met and discussed) with over 100 companies and organisations located within Wales and across the UK. Our activities are not geographically limited to the borders of Wales as many organisations outside of Wales have either expressed an interest in working with companies within Wales, or are undertaking operations with direct relevance to the AD industry in Wales.

It is this day to day interaction with industry and stakeholders, that has allowed the Centre to meet the targets set under the ERDF programme of 'Companies Assisted' (36 achieved so far) and 'Gross Jobs Created' (3 achieved so far) within eligible, Convergence Region organisations.

The Centre also provides targeted financial support to allow eligible Convergence Region SMEs to develop or implement new or improved products, process or services. Through this route, the Centre is working with a number of Welsh companies who are developing innovative solutions to some of the technical problems still faced by the AD industry. These include development of improved small scale CHP plants and the automated monitoring and optimisation of AD processes.

The Centre has also embarked upon a programme of internal technical development across a number of areas relevant to the AD industry. Results are disseminated directly back to

relevant stakeholders and in most cases made available to all on a non-discriminatory basis. Examples of targeted developments are as follows:

1. Establishment of Standard Methodologies for Characterising Feedstocks and Digestates

2. Development of Analytical Methods:

    - the determination of the biogas / methane generation potential for feedstocks and digestates
    - the measurement of volatile fatty acid concentrations in a sample (work is continuing for on-line analysis)
    - microbial assays for profiling digester populations (work is continuing)
    - monitoring siloxanes (initial development)
    - comparison of dewatering efficiencies (initial development)

3. Digestate Dewatering and Nutrient Recovery Processes:

    - Monitoring of samples generated from the mechanical dewatering of digestates including the use of polymers to flocculate fine particles.
    - Determination of the relationship between particle size distribution and COD and how dewatering technologies can impact on these parameters.
    - A wider characterisation of a variety of digestates source from full-scale plants has also taken place
    - Zeta potential monitoring and particle size distributions
    - Laboratory based jar testing of polymers
    - Laboratory based belt press simulation

4. Study of Reactor Microbial Populations
5. Addition of Supplements to the AD Process
6. Pre-Treatment Technologies for Feedstocks
7. Economic and Life Cycle Assessments

All outputs are directly applicable and beneficial to the AD industry in Wales and the UK, and many outputs have also been published in academic papers as listed in Appendix C.

2.0 SUMMARY OF POINTS TO MAKE WITH THE COMMITTEE

2.1 Environmental and Economic Benefits of Anaerobic Digestion

Anaerobic Digestion is a unique technology that delivers integrated services to society. It can deliver environmental benefits and economic opportunities through a number of means, namely;

1. Diversion of solid and liquid municipal, commercial and industrial waste material from landfill or other treatment options with higher emissions, therefore reducing overall CO_2 equivalent emissions;
2. Stabilisation of agricultural wastes (e.g. slurries), reducing GHG emissions and nuisance issues such as odour;
3. Ability of co-digest a number of feedstocks that can allow plants to become feasible at a local level;
4. Biogas produced from the process can be utilised to produce renewable heating or cooling and electricity, or upgraded to biomethane for grid injection and / or vehicle fuel use. After upgrading, methane and carbon dioxide can also be used as chemicals. This displaces fossil fuels and therefore delivers additional GHG savings;
5. The process allows the recovery of nutrients (N, P, K, S and other trace elements) present in the feedstocks, which can then be applied for plant and algae growth, essentially displacing the use of fossil fuel produced fertiliser;
6. Development of green skills and jobs – research and education, consultancy, manufacturing, agriculture, construction, waste treatment, gas and electricity supply and distribution sectors.

The growth in AD is fuelled by several European Directives, applicable across all member states, which are acting to divert organic material away from landfill sites, require that all biodegradable wastes are pre-treated prior to disposal, decrease CO_2 emissions and increase the amount of renewable energy that is produced. Anaerobic digestion is a distinctive technology in that it can contribute towards all of these targets. In recognition of this, many countries are producing strategies for rapidly deploying AD technology within a waste management and / or agricultural setting e.g. in the UK DEFRA has published the Anaerobic Digestion Strategy and Action Plan for England. In Wales, anaerobic digestion has been identified by the Welsh Government (WG) as the favoured option for the treatment of municipal food wastes (Figure 1). WG has made funding available to local authorities wishing to develop AD plants to treat source segregated food wastes.

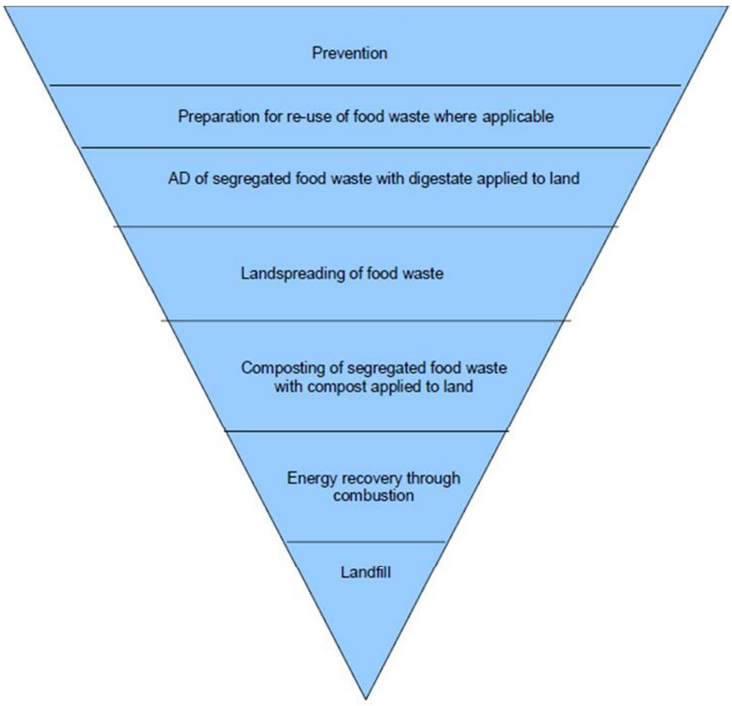

Figure 1 – Proposed Waste Hierarchy for Food Waste in Wales[1]

Across Europe, there are more than 10,000 biogas plants in operation predominantly treating organic wastes and energy crops. The scale of the biogas industry across Europe increased rapidly between 2001 – 2009, as indicated in Table 1.

Table 1 – Biogas Production in Some European Countries (2011-2009)

Country	**Biogas Production (inc. Landfill Gas) (Kt of oil equivalent)**							
	2001†	**2002†**	**2003†**	**2004†**	**2005†**	**2006†**	**2008***	**2009***
Germany	600	659	685	1291	1594	1923	4229.5	4213.4
UK	904	1076	1151	1473	1600	1696	1625.4	1723.9
Italy	153	155	155	203	344	354	410	444.3
Spain	134	168	257	275	317	334	203.2	183.7
Austria	56	59	64	42	31	118	174.5	165.1
Poland	57	63	72	43	51	94	96.1	98

Source: †EurObserv'ER, Biogas Barometer 2001-2006[2]
* EurObserv'ER, Biogas Barmoeter 2008-2009[3]

This expansion is expected to continue, particularly as countries face a reduction in the amount of landfill gas that can be recovered and seek to develop a stronger AD sector by utilising organic wastes and in some countries also energy crops. This pattern has already been seen in countries such as Germany and Austria, and is currently being adopted in many other countries across Europe.

As an example, the biogas industry in Germany in 2006 was estimated to employ around 10,000 people and was worth over €1 billion to the German economy. The German Biogas Association predicted that by 2020, AD will either contribute 17% of total electricity produced, or 20% of the natural gas consumption or 35% of the transportation fuel. A mixture of these uses is likely to take place.

Even countries with a relatively mature biogas industry (e.g. Germany, whose biogas companies now generate annual sales of around 2.3 billion Euros (German Biogas Association, 2011))[4] are predicting sustained growth over the coming years.

The AD Centre is a partner within the EU-IEE Biomethane Regions project and the intended growth of the sector is clearly indicated by activities and feedback from project partners (both industry and energy agencies) within eleven countries in Europe. Therefore, the growth in emerging countries is anticipated to be fairly rapid as well.

This means that the AD industry is expected to see continued strong growth across Europe. In a recent market report[5], BCC Research quantified the market for AD and landfill gas equipment in Europe at 2.4 billion dollars in 2011 and that this would increase to 5 billion dollars by 2015 (an annual growth rate of 15.8%). It is worth reemphasise that this is only related to equipment. According to the Leipzig report on biogas, a Europe-wide biomethane-feed-in strategy will result in the creation of 2.7 million new jobs within the EU. Employment will be generated mainly in agriculture and in the manufacture, construction and management of biogas plants and biogas purification plants.

In the UK, at least 71 AD plants have been implemented for the treatment of municipal, commercial and industrial wastes over the past 3 years, indicating that the UK market is presently moving into its growth phase. A similar situation is occurring in France and Belgium, and very rapid growth is expected in Eastern Europe over the coming five years.

A key point to note is that the environmental and economic benefits of the AD process are maximised when the process is integrated either with processes that generate feedstocks (e.g. food production, other waste management sites), or where process outputs (heat, electricity, biomethane, digestates) can be efficiently utilised. The use of this heat is of vital importance for an ecologically efficient operation and also economically unless biogas is cleaned up and upgraded, WG should act to encourage the development of heat utilisation schemes for domestic, commercial or industrial uses. A report by Pöyry and Faber Maunsel, commissioned recently by DECC noted that district heating provides less than 2% of UK heat

demand compared to 18% in Austria, 49% in Finland and 60% in Denmark. Cost being the main barrier to expansion.

High public acceptance, being a good neighbour as well as achieving good environmental and economic performances from plants, benefits the progress for further deployment of the technology. It will be of benefit for businesses, government and Wales as a whole that plants with life times of 20 years and more, will be built in appropriate locations, featuring best practice and efficient designs. In addition, these plants should operate aiming at an appropriate management of feedstocks and maximising stabilisation of feedstocks and biogas production. At the same time these plants should be capturing most methane and ammonia emissions, removing hydrogen sulphide from the biogas for H&S reasons as well as improving digestate and biogas use.

Environmental performance should be a key factor at selection of the site and at design stage and the plant should be monitored throughout its operation. Already environmental permitting in the UK is ensuring that environmental impact is reduced and plants operate at a reasonable performance; even greater environmental benefits from these plants can be sought and those could be reflected in the incentives regime in the future. Other countries such as Germany are already providing bonuses related for example with biogas upgrading systems, where methane fugitive emissions are below 0.5% of the raw gas. Appropriate plant design, operation and maintenance can reduce fugitive emission of methane and ammonia. A high quality digestate and how it is handled and used is also important not just in terms of providing maximum benefits as a fertiliser and soil conditioner, but also in minimising volatile emissions, odours and plant phytotoxicity.

Overall quantitative environmental assessments of AD plants can only be performed if:

1. Feedstocks utilised can be defined including their generation, collection and transport regimes to the plant;
2. What is the AD plant replacing e.g. landfilling, composting, incinerating or land spreading in case of treatment/disposal of wastes;
3. Full design of the plant as well as the operation regimes are known;
4. The full emissions from the plant are quantified;
5. Digestate quality and utilisation is defined - degree of stability, how are digestates/nutrients utilised (e.g. for the benefit of agriculture or others) and how much of fossil fuel fertilisers can be replaced; how would these have been produced and where would they have been transported from;
6. Use of biogas is defined e.g. so that the energy mix in the country/region is taken into consideration; vehicle fuel is defined as well as type of vehicle and duty cycles.

The boundary for a detailed environmental assessment is extremely wide and complex. Assessments should also be performed for a number of impact categories and not only for

GHG emissions. See section below where some data is presented that reflects the environmental benefits that can be gained from employing the technology.

AD technology, particularly for the treatment of municipal, industrial and commercial wastes, is still rapidly evolving, even in countries that are more advanced than the UK in terms of practical deployment. R&D is ongoing into all aspects of how the process, from feedstock characterisation to final digestate utilisation, can be optimised to maximise the environmental and economic benefits and reduce impacts as far as is practicable. Key areas of research across Europe include:

1. Process monitoring and control to optimise treatment efficiency
2. Effectiveness of pre-treatment technologies
3. Benefits / limitations of trace element additions
4. Dewatering of digestates
5. Novel products from digestates
6. Measurement and reduction of fugitive methane emissions
7. Process integration with other renewable energy / sustainable technologies
8. Biogas upgrading technologies
9. Optimum approaches for utilisation of biogas and biomethane (e.g. novel burners, improved biogas/biomethane engines and solid oxide fuel cells)
10. Novel plant configurations and recovery of high value/ low carbon outputs (e.g. bioplastics, chemicals and nutrients)

The research community is continually widening and strengthening with the increased implementation of AD systems at full scale across Europe. A number of congresses, workshops and conferences have taken place and the events have been very well attended. For example, at the ADSW&EC in Vienna almost 300 attendees were present and 90 oral and 77 poster presentations took place and many more had attended the 12th World Congress on Anaerobic Digestion in Mexico in 2010. However, it is noticeable that recently, more short-term research programmes are taking place (some funded by industry), which sometimes tend to lack in academic rigor largely due to the non controlled conditions and short-term nature of the studies and do not lead to more conclusive results. It is important that R&D programmes are structured in a way that allows for valuable conclusions and relevant advancements in knowledge to be made. This is likely to only occur if both government and industry work together to support necessary R&D initiatives.

2.2 Current Status of AD in the UK and in Wales

In the UK, 2011 represented the year in which AD started to became firmly established as a waste management and renewable energy generation technology, with a number of industrial scale and farm based plants being commissioned treating a variety of feedstocks including municipal, commercial, industrial and agro wastes and energy crops. Of the 71 AD plants in operation in the UK (excluding the ones for sewage sludge treatment), 26 treat farm wastes and two of these are based in Wales; the other 45 treat in its majority organic wastes and one of these is based in Wales. In addition, a number of other plants are currently being planned and constructed.

A number of conferences, workshops and trade shows have taken place in the UK in the last couple of years and to highlight the stakeholder interest in this technology is the attendance of significant numbers at many of these events e.g. 200 exhibitors and 3000 visitors attended the July 2011 ADBA Conference and Tradeshow. The visitors spanned from government, academia, agriculture, waste and energy consultancy sector, equipment manufacturers, to the legal and financial sectors.

However, as per the number of plants on the ground, developments have been somewhat slower than anticipated. The aspects summarised below can be stated to be the main contributing factors for the slow implementation of the technology:

- Uncertainty over how economic incentives would be implemented such as the review of Renewable Obligation Certificates and changes in grandfathering, the delays and conditions related to the Feed In Tariff (FIT) and the Renewable Heat Incentive (RHI), have led to difficulties in securing or committing investment;
- Navigating the town and country planning system continues to be a formidable task, particularly to those who may not have previous experience of developing these type of plants or have experience but only in other countries;
- The long period for the issuing of the ADQP and the PAS 110 and now some uncertainties over the ‘end of waste criteria’ definition for digestate have also slowed down project implementation decisions;
- Quantifying and securing feedstock continues to be a significant hurdle for all AD plants, and in Wales in particular there is strong competition for what is, or will be, a finite amount of organic waste;
- Whilst the local authority based waste infrastructure procurement programme will undoubtedly deliver long term municipal benefits, it has probably contributed to the uncertainty over feedstock availability for merchant providers wishing to develop plants outside of the local authorities related procurement programme;
- The lack of reasonable length waste contracts has also provoked a delay in borrowing approvals;

- The poor economic climate has exacerbated the difficulties in financial borrowing especially when risks are still perceived due to the reasons above.

Despite these difficulties, the picture in Wales is far from bleak. Developers and stakeholders have been busy laying the groundwork required before physically constructing plants – this groundwork in itself requires large inputs of time, resources and finance and demonstrates the commitment shown by industrial stakeholders. This, coupled with some resolution of uncertainties mean that a more rapid development and deployment over the next few years is very probable.

It is clear that the AD and biogas industry in both Wales and the UK is entering a key phase. We are seeing a marked increase in the deployment of AD plants across the UK, and for Wales in particular, the period of 2012 – 2015 will be of particular significance including:

- The conclusion of the municipal food waste element of the waste procurement programme,
- The development of several merchant facilities across Wales,
- The onset of widespread utilisation of digestate materials,
- The requirement to demonstrate the effectiveness of the waste treatment infrastructure,
- The market exploration and development of options such as biogas upgrading, grid injection, digestate processing and nutrient recovery.

Continued support is therefore required to the industry, regulators and stakeholders throughout this important phase. Afterwards, further improvements of the process and integration with more novel approaches and equipment will be key for continually enhancing the environmental and economic status and benefits of these systems.

2.3 Current Barriers to Deployment of AD and Biomethane Projects in Wales and in the UK

The following barriers have been identified against co-digestion of sewage sludge with other substrates: the ROCs issue (fiscal incentives in place provided has a lower band than for other substrates); ownership; capital cost; waste regulation and is seen as non-core business for the Water companies.

Another significant barrier for AD technology deployment in Wales is the ability to connect to the electricity grid. An increased capacity and strengthening of the electricity grid across Wales is still required. This will not only support AD operations, but also other biomass

energy installations as well as wind and hydro electricity generation projects. It is also imperative that the Distribution Network Operators are set reasonable deadlines to return with information regarding connection to the electricity grid and that connection costs are more standardised. Also that renewable electricity generation plants such as AD plants are connected promptly, so to reduce detrimental economic effects.

The RHI for direct heat production is set currently for very low generation rate and therefore not useful to the large majority of the plants. For gas grid injection, oxygen levels requirements should be addressed to allow a slightly higher value, accreditation of less expensive but effective monitoring equipment should take place and in the long term a revision of the need for the requirements of such a high CV and Wobbe index for the biomethane could be performed. Some AD operators may welcome the sharing of the gas injection costs/benefits with the gas distribution operator.

There should also be more communication, discussion and integration of the Environment Agency, statutory consultees and the planning authorities, so that the planning process is performed more effectively.

The incentives provided for the producer of biomethane, when used as a vehicle fuel, need to be equivalent to incentives related to gas grid injection and biogas conversion to electricity, otherwise the biofuel route is likely not to be implemented. Supporting the refuelling infrastructure and vehicle costs could also support the developments.

3.0 FACTUAL INFORMATION FOR THE COMMITTEE

In 2009, the AD centre concluded the potential reduction of CO_2 eq. emissions when diverting municipal food waste from a landfill to an AD plant (based on a CHP scenario). Assumptions and results are presented in Table 2.

Table 2 – Summary of assumptions and results if the food wastes generated in Cardiff were diverted from landfill to an AD plant[6]

Population of Cardiff	305,353 (Census, 2001)
Biodegradable waste yield per person per week	2.2 kg
Biogas yield per tonne of wastes	110 m^3
Biogas methane concentration	60%
Electrical conversion efficiency	35%
Electrical parasitic use	20%
Heat conversion efficiency	50%
Heat parasitic use	50%
CO_2 emission factor from electricity generation	430 kg/MWh (DEFRA, 2007)
CO_2 emission factor from combusting natural gas	190 kg/MWh (Carbon Trust, 2009)
Conversion factors for methane	21 x CO_2 potential (DEFRA, 2007)
CO_2 emissions per capita in Cardiff (2005-2006)	7.2 tonnes (Defra, 2008 - report by AEA)
Landfill methane capture	70%
CO_2 Emissions avoided by diverting the waste from landfill to an AD plant over 25 years	718,982 tonnes
CO_2 emissions displaced from renewable electricity and heat exported by the AD plant over 25 years	96,504 tonnes
Total CO_2 emission reduction: **815,486 tonnes**, equivalent to 4531 people CO_2 emissions for 25 years ~ 1.5 % of Cardiff's population	

Later, DECC stated that digesting 1 tonne of food waste rather than sending it to landfill would save between 0.5 – 1.0 tonnes of CO_2 equivalent[7]. DECC's assessment seem to corroborate previous AD Centre analysis.

Typically, assuming an electrical conversion of 36% and a 50% heat conversion, each tonne of food wastes can yield approximately 236.8 kWh of electricity and 329 kWh of heat, based on a CHP scenario. The same waste can power a car for approximately 1000 km, instead.

The AD Centre has also performed an initial assessment of the energy utilised in the collection and transport of municipal food wastes to centralised AD facilities compared to the inherent energy content within the food wastes. Figure 2 shows that only at 553 miles round trip (collection of wastes and transport of digestate) there is a zero net gain from the energy intrinsic to the food wastes (included was already the energy used for the treatment process). This does not in any way indicate that this mileage related to the transport of wastes and digestates should be a common practice. It would certainly be of benefit to have minimal mileages, both from an environmental as well as an economic point of view. However, the size of a facility is also important in terms of economics and can also impact on the owner/operator ability to minimise impacts and therefore maximise the plant's environmental benefits.

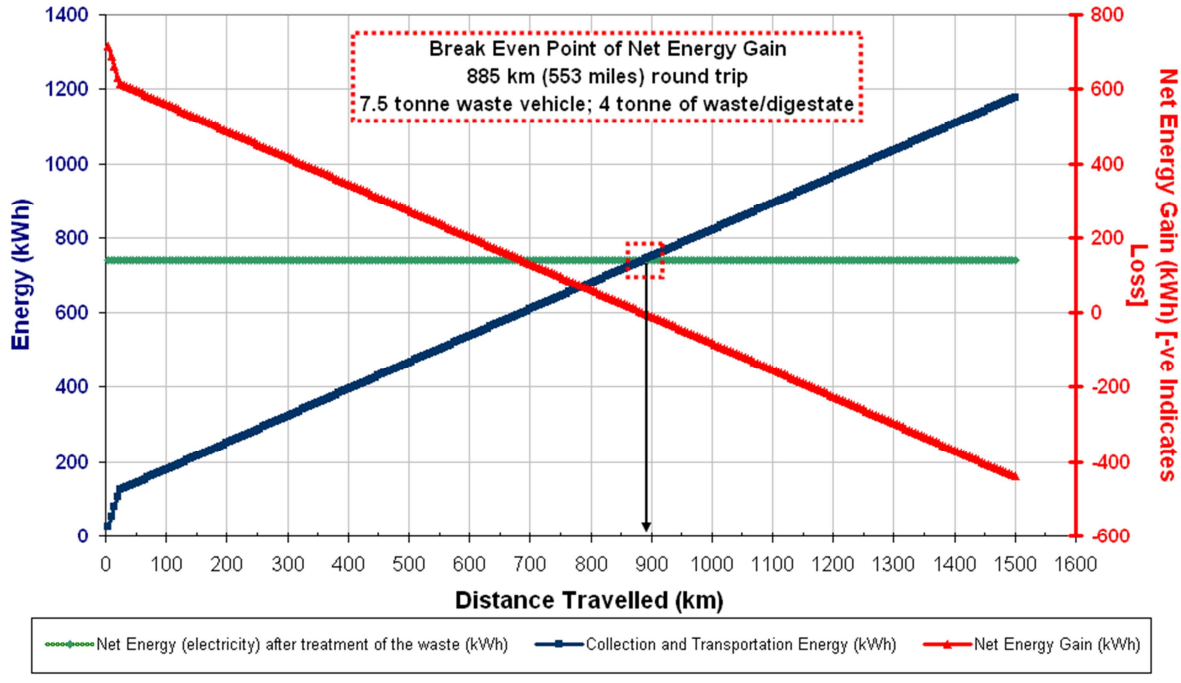

Figure 2 - Collection and transport energy for biodegradable municipal waste and digestates compared to net energy (electricity) from AD (CHP scenario)[6]

Assuming:

- 7.5 tonne vehicle carrying 4 tonne waste (same for digestate)
- Diesel consumption for collection (2 km/l) for 20 km; Diesel consumption for transport (15 km/l) to plant
- 1 tonne of BMW generates 110 m^3 of biogas (60% methane)
- Electricity generation efficiency (35%) and 20% parasitic load
- No export of heat (only 50% of the heat generated is consumed within the plant)

The AD centre has also completed a life cycle assessment of potential biogas infrastructures for the treatment of source segregated municipal food wastes on a regional scale in Wales[8]. The study compared the environmental impacts, across a broad range of impact categories, associated with the construction and operation of AD plants treating source segregated municipal food waste and the utilisation of biogas for either CHP, or injection to the gas grid for end use as either transportation fuel or domestic heat. The paper also assessed whether there were significant environmental benefits from developing a centralised or more distributed infrastructure on a regional basis.

Centralised (comprising of 5 No. medium / large AD plants) and distributed (comprising of 11 No. small / medium AD plants) infrastructures were considered along with biogas end uses of Combined Heat and Power (CHP) and injection to the gas grid for either transport fuel or domestic heating end uses. The assessment was based on the treatment of a total of 275,900 tonnes per annum of source segregated municipal food waste.

Utilisation of biogas for domestic heating purposes via the gas grid displaces the most fossil fuel in both the centralised and distributed infrastructures (6.10×10^7 MJ and 6.60×10^7 MJ, respectively) closely followed by transport fuel use (5.83×10^7 MJ and 6.34×10^7 MJ) and CHP with 80% heat utilisation (5.48×10^7 MJ and 6.04×10^7 MJ). Not surprisingly, CHP with 0% heat utilisation was the worst performing in terms of fossil fuel displacement (1.46×10^7 MJ and 2.02×10^7 MJ) (Figure 3).

The CHP scenarios show the importance of utilising the surplus heat generated when converting biogas to electricity in combustion engines. The scenario with 0% heat utilisation stands out as performing worst compared to other options, whereas the scenario where 80% of the surplus heat is utilised in an adjacent process performs the best out of all the infrastructures modelled. The additional economic benefits associated with the use of excess heat mean that AD schemes in the UK should be actively seeking to utilise excess heat. Where this high utilisation of excess heat at the end user cannot be achieved, CHP will result in higher impacts than alternative uses such as transport fuel.

The injection of biomethane to the gas grid and its end use for domestic heating was found to offset marginally more fossil fuel than transportation end use, however, the overall impacts associated with the end use were considerably greater. This is because the end use of (biogenic) biomethane for domestic heating replaces the use of (fossil) natural gas which, in the context of the model, would have similar emission concentrations at end use i.e. at the domestic boiler. Therefore, whilst the other end use scenarios are benefiting through

reductions in end use emissions by replacing centrally produced electricity or diesel fuel use, the use of biomethane for domestic heating does not incur such benefits. In essence, the emissions at end use are the same whether natural gas or biomethane is used as a fuel. The only savings are therefore those associated with the offsetting of natural gas production and transportation, not emissions at end use.

Given the assumption that the majority of natural gas within the UK grid is used for domestic heating, this result raises the interesting point that whilst the addition of biomethane to the gas grid provides (i) an efficient means of transporting the upgraded biogas, and (ii) corporate advantages associated with the reduction of the carbon footprint of the gas grid, it may not deliver the greatest environmental benefit at this stage. Results suggest that using biomethane to displace more polluting fuels such as liquid fossil fuels will have the greater overall environmental benefit.

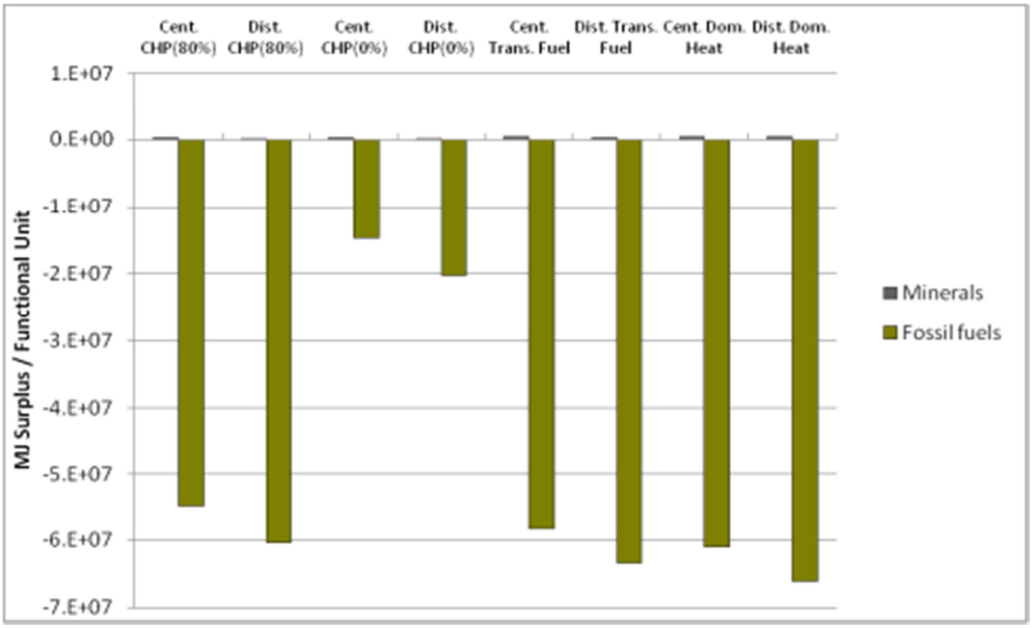

Figure 3 – Fossil fuels and mineral impacts[8]

In 2009-2010, the AD centre analysed the composition of samples of food wastes collected from Welsh homes. Theoretical energy potentials as well as nutrient contents were calculated[9]. The nutrients available in food waste are certainly of significance.

While a number of literature sources report an emission associated per tonne of N produced (through the used of fossil fuels) of around 5 tonnes of CO_2 eq.; Boldrin *et al.* (2009) has stated that 8.9 tonnes of CO_2 eq. are released per tonne of N produced. The same authors reported emissions of 1.8 tonne CO_2 eq./ tonne of P and 0.96 tonnes CO_2 eq./tonne of K. While the production of ammonia has the potential to reduce its impacts and energy consumption in the future, it is very likely that sourcing phosphorus will be significantly more difficult, more expensive and more energy intensive.

See below other correlations between organic resources available in Wales, renewable energy production and potential reductions in CO_2eq. emissions.

In addition to municipal food wastes, there is also in Wales a reasonable supply of commercial and industrial wastes. According to the survey conducted by Urban Mines in 2009, approximately 500,000 tonnes of organic wastes per annum could potentially be available for AD. However, in order to predict biogas potential from these feedstocks, a survey of their composition and organic content would need to be performed in more detail.

One tonne of cattle slurry (wet weight) can yield approximately 43 kWh of electricity and 59.8 kWh of heat; while 1 tonne of dry solids of sewage sludge will convert to 0.8 - 1 MWh of renewable electricity depending on the sludge and the conversion method), plus additional heat. Utilisation of AD to treat dairy slurries can result in a reduction in GHG emissions during storage and field spreading by approximately 59% compared to untreated slurry[10].

In addition to the above waste organic resources, there is also a possibility of utilising agricultural residues such as wheat straw and sugar beet pulp, and energy crops such as fodder beet, whole crop maize, rye grass, sugar beet and sweet sorghum. These could be options that seem to provide good average yields of crops in temperature climates like in Wales and that have also the potential to yield reasonable net energy if digested. Evidence gathering on the energy potential and environmental benefits and impacts of these options is continuing.

4.0 RECOMMENDATIONS FOR THE COMMITTEE TO CONSIDER

A number of recommendations have already been described in the sections above. A summary is here provided.

Size and design of AD plants can differ significantly. AD plants should not be seen as systems that have always the same design or can only operate in certain locations. AD plants have been placed successfully both in industrial as well as rural settings. Proximity to the source of feedstocks and digestate utilisation is certainly important to consider, however other factors such as being served by roads without restrictions to HGVs, as well as reasonable access to the electricity or gas network or to a possible re-fuelling infrastructure for vehicle use are also important consideration factors. It is important that these plants are established and operated within a suitable financial scenario, as this should allow appropriate design and operation methodologies to be followed. These can then be applied to maximise performances, such as through the use of adequate monitoring and control procedures as well as minimisation of plant impacts related to emissions, visual and traffic aspects (see Appendix D), making these plants acceptable neighbours of population centers and even of sensitive environments.

There are still urgent actions by policy makers and regulators required for an effective implementation of the AD industry in Wales (and in the UK). The Wales Centre of Excellence for AD has drawn here some recommendations, for which action is required not only by the Welsh Government but also at a UK level.

1. Along with more conventional CHP solutions, biomethane used for transport fuel and for injection into the gas grid should also be considered in Wales, which should not continue to ignore gaseous transport biofuels:
   - These latter two options may be very attractive in locations where connection to the electricity grid is not possible or has high costs or for medium and large biogas plants in Wales able to generate electricity but where locally generated heat is unable to find a market;
   - Operational, environmental and financial benefits in each case should be assessed
   - Less restrictive requirements for biomethane injection to the gas grid and the possibility of sharing of costs and benefits between the plant operator and gas distributor should be assessed;

2. In addition to the financial support provided to biomethane as a transport fuel under the RTFO or in the future with the implementation of the RED, revision for a lower fuel duty should take place, support should also be provided to the general users of biomethane run vehicles e.g. for refilling stations infrastructure development and vehicle premiums

- Initiatives to incentivise the purchase of vehicles that run on biomethane could be a way of promoting national manufacturing, trade and decreasing the effects of the financial crisis within the automotive sector. It would also contribute to significant environmental benefits;

3. Maintain the renewable energy generation related incentives framework for a number of years without constant alterations;
4. Resist the implementation of the JRC current 'End of Waste Criteria' proposal as it currently stands, namely the solid content requirement for digestates;
5. Improved integration of waste management and rural policies:
   - For co-digestion when beneficial;
   - For effective use of digestates;
   - For effective utilisation of CO_2 in food growth production;
6. The implementation of AD to minimise the carbon footprint of the agriculture sector should also be seen as a priority. Capital support for plants treating agriculture residues, if reduction of GHGs are to take place effectively in the UK farming sector;
7. Careful assessment is required of the potential for local growth of biomass with low water and fertiliser demands as well as water-born biomass as feedstocks for AD and assess if enhanced support would be required;
8. Additional financial support for innovative plants that demonstrate enhanced environmental performance. For example, advanced monitoring and control schemes should be a pre-requisite for installations dealing with municipal, and most commercial and industrial wastes and essential analytical equipment should be a requirement;
9. Implementation of a procedure by Ofgem for claiming ROCs when various feedstocks e.g. food wastes and sewage sludge are co-digested in the same facility and also for the cases where CHP units are shared between landfill sites and AD schemes;
10. Liaison with Ofwat in order for Water Companies to engage in the provision of other services that go beyond their core activity of providing treatment for water and sewage, e.g. co-digesting other feedstocks, upgrade biogas collectively with biogas from other AD plants and inject biomethane collectively with biomethane generated at other AD plants;
11. Continue the support to the Wales Centre of Excellence for Anaerobic Digestion;
12. Invest in R&D for improved performance and environmental benefits for the AD supply chain;
13. Support training of stakeholders which influence AD implementation.

5. REFERENCES

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APPENDICES

APPENDIX A

DISSEMINATION EVENTS ORGANISED BY THE AD CENTRE

AD Centre Organised Events

The AD Centre has organised a number of events to disseminate information to a range of stakeholders including industry, local government, regional government and regulators.

Date	Venue	Title	Attendance
18th Sep. 2008	Llandrindod Wells	Anaerobic Digestion: Technology for Biodegradable Municipal Waste Treatment and Energy Production	All Welsh Local Authorities
11th Nov. 2008	Cardiff City Hall	Implementing Anaerobic Digestion in Wales	116 delegates from industry, local and regional government
25th Jun. 2009	Llandrindod Wells	Anaerobic Digestion and the Planning Process	64 delegates from WG and Local Authority planning departments
21st May 2010	WG, Aberystwyth	Anaerobic Digestion – Process, benefits, impacts, mitigation	52 delegates from WG, Environment Agency and CCW and Local Authorities
27th May 2010*	UoG	Training for the Operators of AD plants	10 future operators of AD plants
27th September 2010	WAG Cathays	Introduction to Anaerobic Digestion - Process and Plant Layouts, Benefits, Impacts and Mitigation	WAG's Planning Policy Team
26-27th May 2011*	UoG	Training the Trainers – Inaugural Biomethane Regions Event	39 delegates from Wales, UK and across Europe

* Events organised in collaboration with the Severn Wye Energy Agency

APPENDIX B

PRESENTATIONS MADE BY THE AD CENTRE

Examples Of Workshops/Conferences Presented At In The Last Year

1. Esteves, S., Devlin, D., Dinsdale, R. and Guwy, A. (2011) Methodologies For Assessing Feedstocks and Digestate Batch Anaerobic Biodegradability. 16th European Biosolids & Organic Resources Conference & Exhibition 14-16th November 2011, The Royal Armouries, Leeds, UK
2. Reed J.P., Devlin D., Esteves S.R.R., Dinsdale R. and Guwy A.J. (2011) Lifting The Lid On Process Optimisation For Anaerobic Digestion. 16th European Biosolids & Organic Resources Conference & Exhibition 14-16th November 2011, The Royal Armouries, Leeds, UK
3. Williams H.G., Kumi, P.J., Devlin, D., Williams, J., Dinsdale, R., Esteves, S., Guwy, A. Lawrenson, G. (2011) Squeezing More Energy From Feedstocks: Enzyme Addition And Enzymatic Activity Monitoring. 16th European Biosolids & Organic Resources Conference & Exhibition 14-16th November 2011, The Royal Armouries, Leeds, UK
4. Sandra Esteves. Maximising Anaerobic Digestion Outputs for a Recycling Economy - ADBA annual AD R&D Forum 1st - 2nd November 2011 – Bristol
5. Sandra Esteves, Desmond Devlin, Richard Dinsdale, Alan Guwy (2011) Performance of various methodologies for assessing batch anaerobic biodegradability. International IWA Symposium on anaerobic digestion of solid Wastes and Energy Crops - 28th August – 1st September, 2011 Vienna, Austria.
6. T. Patterson, S Esteves, R. Dinsdale and A. Guwy (2011) Evaluation of the Policy and Economic Factors Affecting the Use of Biomethane as a Transport Fuel in the UK. International IWA Symposium on anaerobic digestion of solid Wastes and Energy Crops - 28th August – 1st September, 2011 Vienna, Austria.
7. T. Patterson, S Esteves, R. Dinsdale and A. Guwy (2011) Life Cycle Assessment of Anaerobic Digestion of Source Segregated Food Waste with Various Biogas End Uses at a Regional Scale. International IWA Symposium on anaerobic digestion of solid Wastes and Energy Crops - 28th August – 1st September, 2011 Vienna, Austria
8. Sandra Esteves. Monitoring and Control Regimes for Keeping the Anaerobic Consortia Happy. UK AD & Biogas Trade Show and Conference 6th July 2011 NEC Birmingham
9. Sandra Esteves. Status of AD/Biogas/Biomethane in England and Wales - Biomethane Regions Project - Kick off Meeting 24-25th May 2011 – Cardiff, South Wales
10. Sandra Esteves. Monitoring and Control Regimes - Inaugural Bio-Methane Regions Event - Training the Trainers 26 - 27th May 2011 - University of Glamorgan, South Wales
11. Sandra Esteves. Introduction to the Anaerobic Digestion Process for Food Wastes and Anaerobic Processes and Biogas Activity at the University of Glamorgan 4th February 2011 – Burges Salmon office (Bristol)
12. Sandra Esteves. Anaerobic Digestion. Seminar CIWM South West and Wales 11th November 2010 – Bristol
13. Desmond Devlin; Sandra Esteves; Richard Dinsdale; Alan Guwy (2010) 'Investigating the Effect of Acid Pretreatment of Waste Activated Sludge on Subsequent Anaerobic Digestion' 12th World congress on Anaerobic Digestion, 31 October 2010 to 04 November 2010, Guadalajara, Mexico

APPENDIX C

PUBLICATIONS PRODUCED BY THE AD CENTRE

Example of Publications

Esteves, S., Devlin, D., Dinsdale, R. and Guwy, A. (2011) Methodologies For Assessing Feedstocks And Digestate Batch Anaerobic Biodegradability. 16th European Biosolids & Organic Resources Conference & Exhibition 14-16th November 2011, The Royal Armouries, Leeds, UK.

Reed, J.P., Devlin, D., Esteves, S.R.R., Dinsdale, R., Guwy, A.J. (2011). Performance parameter prediction for sewage sludge digesters using reflectance FT-NIR spectroscopy. Water Research, 45(8), pp. 2463 – 2472.

Devlin D.C.; Esteves S.R.R.; Dinsdale R M and Guwy A J. (2011) The Effect of Acid Pretreatment on the Anaerobic Digestion and Dewatering of Waste Activated Sludge. Bioresource Technology 102: 4076–4082.

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Patterson, T., Esteves, S., Dinsdale, R., Guwy, A. (2011). An evaluation of the policy and techno-economic factors affecting the potential for biogas upgrading for transport fuel use in the UK. Energy Policy, 39, 1806 – 1816.

Patterson, T., Esteves, S., Dinsdale, R., Guwy, A. (2011). Life Cycle Assessment of Biogas Infrastructure Options on a Regional Scale. Bioresource Technology, 102, 7313 – 7323.

APPENDIX D

COPY OF POWERPOINT SLIDES (S ESTEVES, 2010) SUMMARISING IMPACTS AND MINIMISATION PROCEDURES

Traffic Impact

Food Waste AD Plant Example

- Plant that treats 30,000 tonnes of C&I or municipal waste per year (1.2-1.6 MW electrical output)
- Gate open 5 days a week – 260 days/year
- Waste in (any additional water is from on-site)

  = 7 vehicles daily in and out, if vehicle carries 17 tonne load, **OR**

  = 12 vehicles daily in and out, if vehicle carries 10 tonne load
- Digestate out if no additional water or effluent are included
  - off site storage = 6 vehicles daily in and out, if vehicle carries 20 tonne load, **OR**
  - On-site storage (6 months store) = 12 vehicles daily in and out (6 months only in a year), if vehicle carries 20 tonne load
- Digestate out if 20% additional water or effluents are included (i.e. total substrate for digestion 36,000 tonnes)
  - off site storage = 7 vehicles daily in and out, if vehicle carries 20 tonne load , **OR**
  - On-site storage (6 months store) = 14 vehicles daily in and out (6 months only in a year), if vehicle carries 20 tonne load

Traffic Impact

Agricultural AD plant Example

- Plant that digests animal slurries (20,000 tpa from 1000 animals) and energy crops (10,000 tpa of maize silage from 250 ha) (500 kW electrical output) (gate open 260 days in the year)
- No external transport required for the slurries or crops OR
- Slurries transported using a 20 tonne vehicle load

  = 4 vehicles daily in and out
- Maize silage transported during a 3 week period in the year

  = 44 vehicles in and out during the 3 weeks in the year (Oct- Nov),

  15 tonne vehicle load
- Digestate to be used potentially by the same farms generating the slurries and crops (maximum 30,000 tpa)

  = 6 vehicles daily in and out, 20 tonne tanker

Plant Emissions and Odour Control

- Odours - ammonia, organic acids and sulphur compounds
- Areas – Reception of wastes, pre-treatment and digestate store and processing
- Minimise air emissions, dusts and odours impact
  - Good house keeping and keep building doors closed
  - Enclosed processes, negative pressure in buildings
  - Adequate air renewals – truck sluice, storage, pretreatment, and digestate processing areas
  - Appropriate treatment of substrates

Plant Emissions and Odour Control

- Exhaust gases (from waste reception area, mechanical pre-treatment and post AD maturation areas or digestate storage) require treatment before being released to atmosphere
- Appropriate exhaust gases cleaning – bioscrubbers, chemoscrubbers (NaOH and wet oxidation using sodium hypochloride), biofilters, ozone treatment and/or activated carbon units needs to be installed
- For high ammonia, bioaerosols and VOC levels from the exhaust air of composting hall – a regenerative thermal oxidation (RTO) plant in combination with an acid scrubber may be required for effectively destroys odorous contaminants, bio-aerosols and volatile organics
  - RTO systems are expensive to install and maintain, and are energy intensive)

Emissions and Odour Control Outside the Plant

- Substrate transport enclosed, sealed tankers
- Sealed tankers for liquor digestates
- Digestate storage tanks covered
- No spreading of digestates, shallow injection will minimise odours

Environment and Sustainability Committee

E&S(4)-09-12 paper 2

Inquiry into energy policy and planning in Wales – Evidence from the Chartered Institution of Wastes Management Wales

The Chartered Institution of Wastes Management

A brief introduction to CIWM Cymru Wales

The Chartered Institution of Wastes Management (CIWM) is the professional body which represents around 7,000 waste and resource management professionals, predominantly in the UK but also overseas. The CIWM sets the professional standards for individuals working in the waste management industry and has various grades of membership determined by education, qualification and experience.

The CIWM Cymru Wales Centre represents Chartered Waste Managers in Wales comprising Waste Mangers at all levels of responsibility throughout every sector of Welsh waste management public, private and community sectors. Be they regulators, operators, environmental consultants or community enterprises.

Main Points to bring to the Committee

The “best” technology for recovering energy from residual waste will depend on local, technical and financial circumstances. Strategic choices should be made on the back of detailed life cycle, environmental and health impact assessments of all options available.

Energy from waste (EfW) and certain other thermal treatment technologies must comply with the Waste Incineration Directive (WID) which ensures that the gasses produced and released into the atmosphere are thoroughly cleaned and constantly monitored. This level of regulation far exceeds other combustion processes such as coal fired power stations or other industrial combustion processes.

EfW currently contributes around 1.5% of the UK’s electricity demand but it is predicted that renewable electricity from thermal combustion of waste could grow from 1.2 TWh to between 3.1 and 3.6 TWh by 2020. This contributes to the UK’s target, set under the 2009 Renewable Energy Directive, to achieve 15% of energy consumption from renewable sources, compared to 3% in 2009.

The UK has also become increasingly dependant on ‘energy imports’. Energy security for the future is a key concern and diversity of supply is an important factor in ensuring a high quality, reliable and affordable supply for the UK. The energy recovered from the thermal treatment of wastes contributes to the base load electricity generation and will contribute to the decarbonisation of the energy sector.

The public perception and understanding of energy recovery from waste is poor and Welsh Government has a role to play in addressing this through more visible policy and leadership than has been evident to date in Towards Zero Waste and Waste Sector Plans. Indeed, future waste strategies alongside Welsh energy review would be an ideal opportunity to do this. As suggested above, Welsh Government policy and support for district heating may also need to be clarified and published.

Factual information the Committee should be aware of:

There are numinous published studies and reports with varying conclusions relating to the health impacts of the health of communities in proximity to Energy from waste Plants. In 2004 Defra published a report entitled “*Review of Environmental and Health Effects of Waste Management: Municipal Solid Waste and Similar Wastes*” This report concluded that such published studies have failed to establish any convincing links between emissions and adverse effects on public health.

The Health Protection Agency published updated position statement, *The impact on health of emissions to air from municipal waste incinerators.*

The Impact on Health of Emissions to Air from Municipal Waste Incinerators (PDF, 121 KB)

After reviewing the latest literature the Agency's general position remains unchanged: Modern, well managed incinerators make only a small contribution to local concentrations of air pollutants. It is possible that such small additions could have an impact on health but such effects, if they exist, are likely to be very small and not detectable.

New incinerator projects are being proposed throughout the country with the aim of reducing the UK's reliance on landfill for municipal wastes. EU legislation has stimulated this major change in waste management strategy.

Concerns have been expressed about the air pollution risks posed by municipal incinerators and the Agency first issued a statement giving advice on health issues in November 2005. Since that time, more research has been carried on the possible air pollution risks posed by modern incinerators and the HPA has therefore issued a new position statement.

This statement was first published in September 2009 and has now been reproduced in the Documents of the HPA series of advisory documents for convenience of

access and citation. **The Impact on Health of Emissions to Air from Municipal Waste Incinerators - RCE 13** The HPA will review its advice in light of new substantial research on the health effects of incinerators published in peer reviewed journals. To date, the HPA is not aware of any evidence that requires a change in the HPA's position statement.

The HPA reviews each individual environmental permit application to ensure that the installation does not present a risk to public health.

The WG Regional Waste Plans "1st *Review Final Strategic Health Impact Assessment March 2008*" concluded that the positive health impacts from energy from waste included employment, stimulated economy, reducing climate change through reductions in greenhouse gases by offsetting the use of fossil fuels and methane reduction from landfill. While negative impacts were likely to be quality of life, annoyance and nuisance impacts from noise, litter and increase vehicle traffic.

The e-Digest of Environment Statistics, published February 2006 Department for Environment, Food and Rural Affairs would also appear to show that high levels of recycling can be compatible with high levels of incineration with the Netherlands thermally treating 32.9% of it municipal waste recycling and composting 64.4% with only 2.7 % going to landfill the best example.

Recommendations for the Committee consideration

Public perception and understanding of energy recovery from waste is poor. Welsh Government policy and leadership is needed to support it if Wales is to meet is sustainability objects.

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Welsh Government should provide further support for the development of district heating via the planning system for new developments and substantial community regenerations by giving suitable incentives to provide district heating

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Long delivery times for new infrastructure mean Welsh Government should encourage use of existing industrial and power generation infrastructure to recover energy from high specification residual waste derived fuels, but ensure that only extends to schemes that are able to demonstrate high levels of energy efficiency.

Welsh Government adheres to its already stated policy position supporting the use of thermal treatment use for up to 30 per cent residual municipal waste

Environment and Sustainability Committee

E&S(4)-09-12 paper 3

Inquiry into energy policy and planning in Wales – Evidence from Eco2

National Assembly for Wales

Environment and Sustainability Committee

Inquiry into Energy Policy and Planning in Wales

Written evidence of

Darren Williams

Eco2 Limited

20 February 2012

Eco2 Limited

Vision House

Cardiff Gate Business Park

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GLOSSARY OF TERMS

Eco2	Eco2 Limited
kgCO2	kilograms of carbon dioxide equivalent (i.e. the sum of the greenhouse gases carbon dioxide, nitrous oxide and methane, with the latter two converted to their equivalent amounts of carbon dioxide when considered in terms of global warming potential)
miscanthus	an annual crop that may be grown as an energy crop in the UK
MW	mega watt (i.e. 1 million watts)
MWh	mega watt hours
tCO2	tonnes of carbon dioxide equivalent (produced by dividing kgCO2 by 1,000)

1 ECO2 LIMITED

1.1 Introduction

1.1.1 Eco2 Limited ("**Eco2**") is a UK-owned business based in Cardiff. The company was set up in November 2002 and has already enjoyed considerable success with projects in a wide range of technologies from onshore wind, landfill gas and biomass. Eco2 is also a shareholder in Tidal Energy Ltd, a company that is developing a tidal energy technology.

1.1.2 Our approach recognises the need to balance commercial issues with the environmental benefits deriving from renewable energy projects. This balance needs to be demonstrated at both strategic and local levels. Eco2 works closely with all key stakeholders, including local authorities, local community groups, planners, environmental groups and government departments. Eco2 always aims to engage with these stakeholders at a very early stage.

1.2 Renewables Experience

1.2.1 Eco2 is led by a team that already had an established track record in the development, construction and operation of a broad range of renewable technologies including onshore wind, biomass, landfill gas, small scale hydro and marine. In particular the team has extensive experience of biomass development with over 310MW of biomass power projects throughout the world over the last fifteen years.

1.2.2 When Eco2 was established in November 2002 its core focus was the development onshore wind projects in the UK. Whilst the company did have some significant success in developing onshore wind the difficulty and unpredictable nature of obtaining planning consent resulted in the company broadening its development activities into other areas such as landfill gas and more recently biomass.

1.2.3 In 2006 Eco2 made the strategic decision to concentrate its efforts mainly in the development of biomass projects. Eco2 is currently developing a portfolio of 10 biomass plants, generally straw or wood-fired. These projects are located mainly across the UK and Spain.

1.2.4 Specific biomass experience includes:

(a) Western Wood Energy Plant, 14MWe wood fired (see Section 3.1)

(b) Sleaford Renewable Energy Plant, 40MWe straw fired (see Section 3.3)

2 EVIDENCE

2.1 General implications

Question:
What are the implications for Wales if responsibility for consenting major onshore and offshore energy infrastructure projects remains a matter that is reserved by the UK Government?

2.1.1 It need not be the case that this is a disadvantage for Wales because England and Scotland have a much higher success rate in the planning process than decisions made in Wales. Renewables UK statistics show that the average determination period in Wales is over double that of England and Scotland and the success rate is half. Eco2's view is that this stems from an inefficient consultative process and an inability to make objective decisions at the end of it. Unless the fundamental reasons why Wales is poor at making positive decisions in a timely manner is addressed there is a danger that in transferring such decisions to the Welsh Government that the success rate of major onshore and offshore energy infrastructure projects will actually fall.

2.2 Affect on achievement

Question:
How does this affect achievement of the Welsh Government's aspirations for various forms of renewable and low carbon energy as set out in the Energy Policy Statement?

2.2.1 Clearly decisions being made outside of Wales partially remove Welsh Government's ability to determine projects. However, any objection from Welsh Government or the host local authority would result in public inquiry in any event.

It could be an advantage that difficult decisions which historically have been shown to be more difficult to make in Wales continue to be made in Westminster.

2.3 Affect on delivery

> *Question:*
> *How does this affect delivery of the Welsh Government's target for a 3% reduction in Green House Gas emissions per annum from 2011?*

2.3.1 Eco2's view is that the Welsh Government is more likely to achieve its Greenhouse Gas emissions target from 2011 with the present system unless radical changes are made to the consultative process in Wales.

2.4 Impact of consenting decisions

> *Question:*
> *What will be the impact if consenting decisions on major infrastructure projects and associated development are not all taken in accordance with Welsh planning policy?*

2.4.1 Whereas there is a small chance that projects which would have been rejected at Wales level will gain consent, there is a far higher chance that projects which are desirable to the Welsh Government will not get consented in a timely manner.

2.5 The petitions

> *Question:*
> *[What comments can be added regarding] the two petitions about Welsh Government planning guidance as it relates to onshore wind energy and the impact on local communities and infrastructure?*

2.5.1 The situation regarding the two petitions was entirely predictable and stems from a flawed sieving exercise in the establishment of the Tan 8 areas. Too high a priority was given to forestry areas and too little to grid and road infrastructure. Had the original exercise taken into consideration these issues far more of the Tan 8 areas would have been close to industrialised areas.

2.6 Role of consenting agencies

2.6.1 The one agency not mentioned is the Countryside Council for Wales. Our experience is that they are very difficult to deal with and inevitably end up in objecting to windfarm applications.

3 BACKGROUND INFORMATION

3.1 Onshore Wind Developments

3.1.1 As stated above when Eco2 was formed in 2002 the business strategy was centred on onshore wind. Eco2 concentrated its efforts on projects in Wales and Scotland on the basis that Eco2 had local contacts in both countries, the prospects of receiving planning permission in Scotland were very good and the Welsh Government were just about to release its strategy to promote the development of onshore wind in Wales.

3.1.2 Eco2's Scottish onshore wind development experience is:

(a) Dummuie

The Dummuie project was the first project submitted for planning by Eco2. Although the initial planning application was turned down at committee the project was successful in obtaining permission following a written representation inquiry with the Scottish Executive. The project was awarded planning in September 2004; the whole planning process took twelve months from original application. The project was built in 2005 and has been operating well.

(b) Hatton

The project was submitted for planning in November 2006 and was awarded planning in July 2007. The first turbine was erected in November 2011 and is now operating. Total time for determination 8 months.

(c) Bogenlea

The project planning application was submitted in May 2009 and was awarded at committee in December 2009. The project construction will commence this year. Total time for determination 7 months.

3.1.3 Eco2's Welsh onshore wind development experience is:

(a) Betws

The project was started in 2003 and after extensive consultation all associated parties the planning application was formally submitted in May 2005. Following and extended planning process was awarded planning permission by Carmarthen CBC in June 2007. Despite no objection from CCW during the planning process CCW requested that the Welsh Government call the in the project and this was done in October 2007. A two week public enquiry was held in September 08 and the Inspectors report was provided to the Welsh Government in November 2008. The Welsh Government issued its formal decision was issued in June 2009. Total time for determination 49 months.

(b) Pendragon Fach

An application for four turbines was submitted in July 2006. The project was originally much bigger as the site resource is excellent and it was expected that this area would be the TAN8 area for east Wales. The smaller application was structured to comply with TAN8 policy. The project was determined by Blaenau Gwent CBC in January 2009. The project was recommended for approval by the planning officer but was subsequently turned down at committee. A two week public inquiry was held in April 2010 and the project was eventually issued with a refusal notice in July 2010. Total time for determination 48 months.

(c) Glyncorrwg

The planning application was submitted for this project in May 2007 and was turned down at planning committee in December 2007. It was Eco2's intention to appeal this decision as the project was situated in a Tan 8 area and it was felt that the planning issues that resulted in the refusal could have been addressed. However, the TAN8 tender process resulted in all Forestry Commission access rights being controlled by the developer of Pen y Cymoedd project. Eco2 has therefore been unable to secure and access agreement for the Glyncorrwg project and it is not possible to justify the costs of re-submission until these arrangements can be agreed.

(d) Fochriw

This project was approved by Caerphilly CBC within 11 months of submitting the application. Eco2 is currently working on constructing this project.

3.2 Western Wood Energy Plant

3.2.1 The Western Wood Energy Plant is Wales' first commercial scale biomass project and generates 14MWe by burning forestry wood and clean wood processing residues in a state-of-the-art combustion plant. The power station situated in Margam, South Wales is now fully operational following a successful two year construction period. With high load factors it is one of the best performing biomass sites in the UK. It also took the honours in the category of Sustainability at the LABC Building Excellence Awards 2009.

3.2.2 The plant is owned by Western Bioenergy Ltd. Good Energies (UK) LLP is the principal shareholder and local company, the Western Log Group owns the minority interest.

3.2.3 The Western Wood Energy Project was first envisaged by the Western Log Group which has been involved in the timber industry for many years.

3.2.4 Eco2 joined the project in 2004 as a joint venture partner, bringing with it the expertise necessary to put together a suite of construction and finance contracts. Eco2 now manages the fuel logistics and administration at the site.

3.2.5 Good Energies (UK) LLP, a leading global investor in the renewable energy and energy efficiency industries, provided the equity and secured debt finance from the Bank of Tokyo Mitsubishi to allow the construction to commence. The project's renewable energy credentials also allowed it to secure substantial grants from the Welsh European Funding Office and the DTI Bioenergy Capital Grant Scheme.

3.2.6 Construction commenced in October 2006 for the two year build phase, the first electricity was generated in July 2008 and the plant became fully operational and was handed over to Western Bioenergy Ltd in November 2008. The plant is operated by the Western Biomass Operating Company Ltd, a subsidiary of the build consortium who won a five year operating concession in open tender.

3.2.7 The Forestry Commission is the largest single fuel supplier to the plant and is one of a number of companies who have entered into long term supply agreements with Western Bioenergy Ltd. The majority of the fuel is sourced from the Welsh forests and timber industries.

3.2.8 The Plant is designed to only use clean wood as fuel; no contaminated material (for example, treated or painted timber) is accepted under the terms of the operating permit. By burning this sustainable fuel, some 47,000 tonnes per year of carbon dioxide from fossil fuel are avoided.

3.3 Sleaford Renewable Energy Plant

3.3.1 The Sleaford Renewable Energy Plant is a straw-fired power station to be located in Lincolnshire, in the heart of the "bread basket" of England.

3.3.2 The project was granted planning permission in November 2008 and will generate 38MWe using proven, efficient technology specifically designed for the clean combustion of straw.

3.3.3 In December 2011, Eco2 successfully sold the Sleaford project to specialist investment fund BNP Paribas Clean Energy Partners, in a landmark £170million deal.

National Assembly for Wales

Environment and Sustainability Committee

Draft Contaminated Land Statutory Guidance – 2012

E&S(4)-09-12 paper 5

1. Purpose

1.1 To provide the Environment and Sustainability with an overview of the process for considering the *Draft Contaminated Land Statutory Guidance – 2012* ('the draft guidance') and to set out the concerns that have been raised by the Chartered Institute for Environmental Health Cymru-Wales in relation to the draft guidance.

2. Background

2.1 On 7 February 2012, the Welsh Government laid the *Contaminated Land (Wales) (Amendment) Regulations 2012* ('the Regulations').

2.2 The Welsh Government laid the draft guidance alongside the Regulations. The Constitutional and Legislative Affairs Committee is required to consider the Regulations in the usual way, but it is not required to consider the draft guidance.

2.3 The Environment and Sustainability Committee is the most appropriate Assembly Committee for considering the draft guidance as contaminated land is a policy area that falls within its remit.

3. The concerns that have been raised

3.1 The Chartered Institute for Environmental Health Cymru-Wales has raised a range of concerns in relation to the draft guidance.

3.2 The Research Service has analysed these concerns and compared them with what the Welsh Government has set out in its explanatory notes to the draft guidance. This has been done to assist Members in considering these concerns. This detailed analysis, prepared by the Research Service, is annexed to this covering paper.

4. The procedure that applies to this draft statutory guidance

4.1 The draft guidance cannot be issued by the Welsh Ministers until 40 days (beginning on 7 February) have passed. If during that period the National Assembly for Wales resolves that the draft guidance should not be issued then the Welsh Ministers may not issue it.

4.2 The deadline for a motion being considered is 24 March 2012.

4.3 In practical terms, this means that an Assembly Member, who wished to table a motion that the guidance should not be issued, would need to do so by 13 March 2012 (allowing the motion to be considered in Plenary on 20 March).

4.4 Should the Environment and Sustainability Committee wish to consider and report on the guidance, then it would need to report in sufficient time for it to inform Assembly Members' decisions as to whether they wished to table a motion that the guidance should not be issued.

4.5 In practical terms, this suggests reporting no later than Friday 9 March.

5. Options for the Committee

In deciding how to proceed, Members may wish to consider one of the following options:

1. Writing to the Minister for Environment and Sustainable Development to set out the concerns that have been raised and copying this letter to all Assembly Members so that they are also aware of the concerns.

2. Issuing a report to the Assembly identifying the concerns that have been raised in relation to the draft guidance (thus leaving it to individual Assembly Members to decide whether they wish to table a motion).

3. Issuing a report to the Assembly identifying the concerns that have been raised in relation to the draft guidance and recommending that the Assembly resolves that it should not be issued. In this circumstance, the Chair might wish to consider tabling the necessary motion.

Alun Davidson
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029 2089 **8639**

Annex – Draft Contaminated Land Statutory Guidance

1. Introduction

In December 2010, DEFRA and the Welsh Government launched a joint consultation seeking views on proposals to update and revise the contaminated land regimes in England and Wales under Part 2A of the *Environmental Protection Act 1990*.[1]

Responsibility for issuing statutory guidance on contaminated land in Wales under the 1990 Act lies with the Welsh Ministers.

A draft of the Contaminated Land Statutory Guidance for Wales 2012 was laid before the Assembly by the Minister for Environment and Sustainable development on 7 February 2012.[2] It has been prepared in the most part by DEFRA and almost identical draft statutory guidance for England was laid before the UK Parliament on the same day. The guidance does not relate to radioactively contaminated land which is covered by separate statutory guidance.

2. Draft guidance

According to the draft guidance "Wales has a considerable legacy of historical land contamination involving a very wide range of substances."

It proposes a change in the methods used for the risk assessment of contaminated land by local authorities in Wales. Under Part 2A of the 1990 Act, local authorities have a duty to inspect their areas to detect any land which ought to be determined as 'contaminated'. This process is led by local knowledge of previous contaminative land uses and once such land is discovered, in the absence of a suitable proposal by the owner, their job is then to require its remediation.

The cost of remediation is borne under a hierarchy of liability, ideally, by the original polluter but where they cannot be found, by the current owner or, in default (e.g. where that would cause undue hardship), by the local authority using public funds under a scheme administered by the Environment Agency. The Environment Agency acts as a secondary regulator responsible for "special sites" (e.g. relating to specified types of water pollution).

According to the Welsh Government:

> The current Statutory Guidance fails to give an adequate explanation, particularly on the key legal trigger of when land would pose a "significant possibility of significant harm to human health". It merely says that a "significant" risk would exist if human exposure to a contaminant would *represent an unacceptable intake or direct bodily contact, assessed on the basis of relevant information on the toxicological properties of that pollutant*. But it does not explain how to decide what "unacceptable" means.

[1] Welsh Government and DEFRA, *Public consultation on changes to the Statutory Guidance under Part 2A of the Environmental Protection Act 1990*, December 2010
[2] Welsh Government, Contaminated land statutory guidance for Wales 2012-draft. [accessed on 22 February 2012]

And

> The reason why the current Statutory Guidance does not explain how to decide when land is contaminated land is that it was published on the assumption that (non-statutory) "guideline values" would be produced that would describe levels of contamination above which there could be assumed to be a significant risk. However, to date (despite various attempts) it has not been possible to publish satisfactory guideline values.[3]

The Welsh Government explains the reasons why these 'guideline values' have not been produced is partly because the current statutory guidance does not explain what they should aim to achieve and in particular it gives no indication of where they should seek to draw the line on a sliding scale of risk to describe whether or not land should be considered to be contaminated land. For this reason it states that there is no firm statutory basis on which to set the 'guideline values' and this would have raised issues over the legal robustness of any such values that might have been produced.

There are also a number of other technical reasons that are set out in an Annex to the Explanatory Memorandum.[4]

The Welsh Government considers that the lack of clarity stemming from the current statutory guidance has led to very substantial "regulatory creep". To address this, it says that the guidance has been revised in order to achieve the intention of the Part 2A legislation when it was introduced – i.e. to protect human health and the environment from significant risks, whilst avoiding disproportionate impacts on society and businesses.

The draft guidance proposes a **new four category test to help decide when land is, and is not contaminated land:** The new test will introduce broad categories to describe areas on the broad spectrum of risk encountered by assessors. The categories are as follows:

> **Category 1** describes land which is clearly problematic for example because similar sites are known to have caused a significant problem in the past.
>
> **Categories 2 and 3** cover the less straightforward land where detailed consideration is needed before deciding whether it is contaminated land. The test rests on whether or not the Local Authority believes there is a strong case for regulatory action – and thus whether it should be placed into Category 2 (contaminated land) or Category 3 (not contaminated land). The authority would start by considering health risks alone, and if this leads it to consider that land is clearly problematic or non-problematic the decision could be taken at this point. However, if this does not lead to a decision (e.g. because of uncertainty over the risks), the authority would consider wider socio-economic factors (e.g. cost, views of local people, etc) before deciding. If the authority still cannot decide, the default decision is that the positive legal test for contaminated land has not been met and the site should therefore go into Category 3 (not contaminated land).

[3] Welsh Government, *Explanatory Memorandum to the Contaminated Land (Wales) (Amendment) Regulations 2012 and the draft Contaminated Land Statutory Guidance 2012*
[4] ibid

Category 4 describes land that is clearly not contaminated land. The new Category 4 test is particularly important in terms of reducing uncertainty over when land is clearly not contaminated land in the legal sense. For example, it would clarify that Category 4 land would include land where there are only normal background levels of contamination (unless there is some exceptional reason to consider there may be a problem).

3. Concerns about the new guidance

The **Chartered Institute for Environmental Health Cymru-Wales** has raised concerns about the proposed changes to the guidance for Wales.[5] In particular it is concerned that the new four category approach will 'water-down' the need for science in favour of a more qualitative approach to risk assessment and the identification of contaminated land. It considers that the proposed changes will relax the standard for what is contaminated land, reducing the number of sites requiring remediation and as a result will reduce the level of health protection to land users. It believes that the changes will have the effect of raising the threshold for what local authorities will regard as 'contaminated', to the benefit of developers (to whom almost all the monetised benefits are assigned in the Regulatory Impact Assessment), but to the detriment of health protection.

The institute considers that it is the lack of further technical guidance on 'guidance values', rather than shortcomings with the current statutory guidance, that has caused uncertainty, slowed decision making and led to some poor decisions. Instead of a risk assessment based on toxicology, the CIEH Cymru-Wales believes that the new approach will require local authorities to ask if anyone knows of land in a similar state that has caused harm in the past. In its view this is a poor test because "the absence of evidence of risk is not the same as the evidence of the absence of risk."

Ii is also concerned that where it is not easy to reach a decision on whether or not to determine land as contaminated, local authorities will also have to consider the socio-economic costs and benefits of carrying out remediation work for that site. The present guidance introduces socio-economic factors only at the stage of remediation after a site has already been identified as contaminated. The CIEH Cymru-Wales view is that not only will it be difficult to quantify such costs, but they cannot cancel out the risks inherent from the contamination. It is concerned that decisions will no longer be made on health grounds alone. The Society of Brownfield Risk-assessors, the UK Environmental Law Association, the Environmental Protection Group, and the Chartered Institute of Water and Environmental Management have also said they consider that including socio-economic factors could lead to uncertainty and complications.

The Institute also considers that through the draft guidance, local authorities are being encouraged to condone what is called 'normal' contamination. The definition of 'normal' is to be determined by what is widespread locally or regionally or nationally in similar circumstances. It considers that this approach maintains the same lack of clarity and predictability that the Welsh Government says is the main criticism of the current

[5] The CIEH has raised similar concerns in England: Chartered Institute for Environmental Health Press Release: *New contaminated land guidance putting public health at risk, claims CIEH*, 7 February 2012

guidance. The UK Environmental Law Association, Environmental Protection UK, and Specialists in Land Condition have also suggested that the new proposed definition of 'normal' contamination may cause problems with risk assessment.

Agenda Item 5

Environment and Sustainability Committee

Meeting Venue:	**Centre for Alternative Technology, Machynlleth**
Meeting date:	**Thursday, 9 February 2012**
Meeting time:	**11:00 – 13:25**

Cynulliad Cenedlaethol Cymru
National Assembly for Wales

This meeting can be viewed on Senedd TV at:
http://www.senedd.tv/archiveplayer.jsf?v=en_500004_10_02_2012&t=0&l=en

Concise Minutes:

Assembly Members:	**Dafydd Elis-Thomas (Chair)** **Mick Antoniw** **Rebecca Evans** **Russell George** **Vaughan Gething** **Llyr Huws Gruffydd** **William Powell** **David Rees** **Antoinette Sandbach**
Witnesses:	**Michael Butterfield, Llangattock Green Valleys** **Peter Davies, Commissioner for Sustainable Futures** **Rod Edwards, Dulas Ltd** **Andrew Padmore, Egnida** **Michael Phillips, Dulas Ltd** **Andy Rowland, ecodyfi**
Committee Staff:	**Alun Davidson (Clerk)** **Catherine Hunt (Deputy Clerk)**

1. Introductions, apologies and substitutions

1.1 Apologies were received from Julie James. There were no substitutions.

2. Inquiry into energy policy and planning in Wales – Oral evidence

2.1 The witnesses responded to questions from members of the Committee on energy policy and planning in Wales.

2.2 Rod Edwards agreed to provide the Committee with a copy of Dulas' 2004 paper on TAN8.

2.3 Andy Rowland agreed to provide further information on the assertion that some town and community councils in Montgomeryshire object to all applications relating to wind turbines.

3. Papers to note

3.1 The Committee noted the minutes of the meetings held on 26 January and the additional written evidence from West Coast Energy on energy policy and planning in Wales.

TRANSCRIPT

View the meeting transcript.

Environment and Sustainability Committee

Meeting Venue:	**Committee Room 3 - Senedd**
Meeting date:	**Wednesday, 22 February 2012**
Meeting time:	**09:30 - 11:30**

Cynulliad Cenedlaethol Cymru
National Assembly for Wales

This meeting can be viewed on Senedd TV at:
http://www.senedd.tv/archiveplayer.jsf?v=en_400004_22_02_2012&t=0&l=en

Concise Minutes:

Assembly Members:	**Dafydd Elis-Thomas (Chair)** **Mick Antoniw** **Mark Drakeford** **Russell George** **Vaughan Gething** **Julie James** **Alun Ffred Jones** **William Powell** **David Rees** **Antoinette Sandbach**
Witnesses:	**Tonia Forsyth, Marine Energy Pembrokeshire** **Toby Gethin, The Crown Estate** **Dr Dickon Howell, Marine Management Organisation** **Dr David Tudor, The Crown Estate** **Dr Miles Willis, Low Carbon Research Institute Marine**
Committee Staff:	**Alun Davidson (Clerk)** **Catherine Hunt (Deputy Clerk)** **Graham Winter (Researcher)** **Nia Seaton (Researcher)**

1. Introductions, apologies and substitutions

1.1 Apologies were received from Rebecca Evans and Llyr Huws Gruffydd. Mark Drakeford and Alun Ffred Jones attended as substitutes.

2. Inquiry into energy policy and planning in Wales - Evidence on marine and tidal energy

2.1 The witnesses responded to questions from members of the Committee on marine energy in relation to the inquiry into energy policy and planning in Wales.

3. Motion under Standing Order 17.42(vi) to resolve to exclude the public from the meeting for item 4

3.1 The Committee agreed the motion to exclude the public from the meeting for item 4.

4. Inquiry into Proposed reforms to Common Fisheries Policy – Draft letters of the Common Fisheries Policy Task and Finish Group

4.1 The Committee agreed the draft letters from the Common Fisheries Policy Task and Finish Group on proposed reforms to the Common Fisheries Policy.

5. Papers to note

5.1 The Committee noted the minutes of the meeting held on 1 February.

TRANSCRIPT

View the meeting transcript.

John Griffiths AC /AM
Gweinidog yr Amgylchedd a Datblygu Cynaliadwy
Minister for Environment and Sustainable Development

Llywodraeth Cymru
Welsh Government

Eich cyf/Your ref
Ein cyf/Our ref

Dafydd Ellis-Thomas AM
Chair, Environment and
Sustainability Committee

15 February 2012

Annwyl Dafydd,

Thank you for your letter of 7 February following my appearance before the Environment and Sustainability Committee on 1 February.

As requested, please find attached my response to the questions which the Committee were unable to reach during the evidence session.

Thank you for the opportunity to provide evidence to the Committee on the inquiry into the business case for the single environment body.

Yn gywir,

John

John Griffiths AC / AM
Gweinidog yr Amgylchedd a Datblygu Cynaliadwy
Minister for Environment and Sustainable Development

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Llinell Ymholiadau Cymraeg 0845 010 4400
Correspondence.John.Griffiths@wales.gsi.gov.uk

Questions from the Environment and Sustainability Committee to the Minister for Environment and Sustainable Development that were not reached on 1 February 2012

When is a draft Order to establish a new body likely to be laid before the Assembly?

In order to meet our proposed vesting date of April 2013, we would need to lay the draft Orders before the end of 2012.

What consideration did you give to the Welsh Government's sustainable development aims in reaching your decision?

I believe the business case fully reflects our sustainable development aims. Both the consultation on the 'Sustaining a Living Wales' Green Paper and the consultation on the proposals for the single body, reinforce that view.

Will the single environment body need additional HR expertise from the Welsh Government and will this generate costs not included in the Business Case?

There are a number of options for the body to source HR expertise including Welsh Government and external sources. The HR workstream has taken account of the cost of providing this expertise.

However, it is important to recognise that CCW already provides a full HR service to its staff, including expert advice.

Are you confident that a single environment body and Welsh forestry business will still have access to these services at no cost?

Defra hold the budget on a GB-wide basis and we would either continue to receive services as now, or be provided with our share of the budget to commission our share of the work.

Annex 16 of the Business Case estimates a loss of productivity due to the creation of a single environment body of £1.9m. Are you confident that the figures provided in the Business Case are a true reflection of the potential risks?

The £1.9m figure relates to the time required for events, recruitment and additional training. There is a substantial budget allocation for risk elsewhere in the business case.

What consideration did you give to the impacts that the transition period will have on the existing bodies' ability to deliver services to key stakeholders such as local authorities and businesses?

The impact on the bodies during the transition period is around 3% of their total staffing. I would not expect an impact on this scale to have a major impact on service delivery and I would expect the bodies to prioritise delivery of key external services. I have asked them to identify any significant problems.

What consideration did the Business Case give to the relationship between local authorities, National Parks and a new environment body?

The business case has recognised that the creation of the new body will provide a single focus for planning advice and regulatory decisions which we believe will simplify relationships with local authorities and national parks, and will benefit all parties.

What discussions were held on the possibility of functions moving between a new body and local authorities and how did this effect your decision?

In the course of developing the business case, we looked at local authority functions. This included discussions with WLGA and a meeting with the Environmental Directors of local authorities. Specific areas of work we considered included air quality monitoring and contaminated land. However, we do not anticipate making changes in these functions as part of the creation of the body. These are matters which can be considered at a future date.

What consideration was given as to how a new body will engage with local communities?

We will set out in our consultation a requirement for the new body to bring forward its own proposals for engagement with local communities, on which it would need to consult. We think it is essential that the body engages effectively with local communities and that it has ownership of the mechanism through which it does that.

What consideration has been given to where a new body would be situated within Wales?

We have not attempted to undertake organisational design as all of the lessons learned from past reorganisations demonstrate that this is a matter left for the incoming shadow organisation. However, we have set out some broad principles including an expectation that the body would be operationally located at a local level throughout Wales.