PROPOSED BIOMASS FUELLED POWER PLANT

LAND OFF BALLYVANNON ROAD, NEAR GLENAVY

COUNTY ANTRIM

OPTIONS APPRAISAL

OUR REF: 05/2332/C/W

MAY 2009

the
GRAHAM BOLTON PLANNING
partnership limited

The Graham Bolton Planning Partnership Ltd is a Town Planning and Environmental Consultancy based in Manchester, England, established in 1986. The Practice primarily handles commercial projects including hospital and mental health developments, waste recovery and handling proposals, industrial and residential schemes. The Practice has expertise in projects which require separate Licensing or Permitting under Environmental Legislation and specialises in dealing with development proposals where both planning and environmental licensing is required.

The Practice includes amongst its specialisms projects involving the handling and treatment of agricultural wastes including animal by-products, and acts for a large proportion of the UK's rendering industry, a number of abattoirs and other businesses involved in animal by-products. Developments involving the handling, treatment use or disposal of other waste streams are also an area of work covered by the Practice.

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EXECUTIVE SUMMARY

1. Rose Energy Limited proposes to build a biomass fuelled power plant on a site off Ballyvannon Road, near Glenavy, adjacent to the rendering plant of Ulster Farm By-Products Ltd.

2. The proposal is for a 100MWe thermal input, 30MWe electrical output, power plant using poultry bedding and meat and bone meal (MBM) as the fuels. Approximately 25MWe of electrical output will be exportable to the NI grid. Approximately 220,000 tonnes of poultry bedding from broiler production – poultry litter and the bedding upon which poultry is reared – and 40,000 tonnes of MBM will be used, the adjacent Ulster Farm Rendering Plant being the primary source of the MBM, which is currently exported from that plant to England and Wales for use as a fuel in power plants and cement kilns, or landfilled in Scotland.

3. The planning application and accompanying Environmental Statement was submitted on 4 June, 2008, following an extensive Environmental Impact Assessment. Following consultations on the planning application by The Planning Service of Northern Ireland, a request was made under Regulation 15 of The Planning Environmental Impact Assessment Regulations (Northern Ireland) 1999 for further information to be submitted on a number of matters. Initially by letter dated 11 February, 2009, a request was made for an "Economic Appraisal" to be submitted, subsequently amended by the Planning Service's letter dated 17 February, 2009, and amended and clarified further at a meeting with the Planning Service and representatives of the DoE Economic Branch held in the offices of the Planning Service on 4 March, 2009.

4. The Planning Service's letter of 31 March, 2009, superseded the request in previous correspondence under Regulation 15 for an "Economic Appraisal" and replaced it with a request for an "Options Appraisal" with guidance that in compiling this "Options Appraisal" reference be made to the Planning Service's letter of 17 February, 2009, and the meeting of 4 March, 2009.

5. The Nitrates Directive requires action to reduce excessive application of nutrients. Over-winter field storage of poultry litter is presently allowed under a "derogation" agreed with the European Commission. A long term solution is required. Three independent reports, one prepared on behalf of the poultry industry and supported by Invest NI, one prepared by the Expert Group on Alternative Use of Manures (EGAUM), and a third by the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) all concluded that a single poultry litter fired generating plant is the appropriate option and technology to be adopted in Northern Ireland in addressing the problem resulting from the excess amount of manures and poultry litter in particular and compliance with the requirements of the Nitrates Directive and associated regulations.

6. The options available to the industry are to:

- Continue spreading on land
- Disposal to landfill site
- Export to the United Kingdom for use as a fuel in power plants, or disposal
- Technological solutions

7. Continued spreading on land is not an option as there is insufficient nutrient poor land in Northern Ireland, and the shortage of suitable land is compounded by the geographic concentration of intensive pig and poultry units. The Economic Branch of the DOE implicitly acknowledges that there is no "do nothing option" of continued spreading.

8. Disposal to landfill is not a viable option. Current indicative costs for disposal within Northern Ireland would be £75 per tonne, exclusive of transport costs and VAT, but inclusive of the current standard rate Landfill Tax of £40 per tonne (2009 rate), or in excess of £16.5M per annum, exclusive, at current day prices. This would increase to over £23.5M per annum by 2013 with the escalating Landfill Tax even on the assumption that rates for landfill sites remain constant.

9. Export of the material to the UK is not a viable option either. There is not the capacity within the UK of appropriately designed power plants to receive and utilise large amounts of poultry bedding as a fuel. The current capacity in the UK is approximately 600,000 tonnes per annum, and could not accommodate the 200,000 tonnes plus per annum disposal requirement of poultry bedding produced from broilers within Northern Ireland. Moreover, material from Northern Ireland would be competing with that from the United Kingdom and will always be at a disadvantage due to the higher transport costs of having to ship the material overseas into ports either in Scotland or England. Disposal to landfill may be slightly cheaper than currently available in Northern Ireland but remains a non-viable alternative which the poultry industry in Northern Ireland could not bear in competition with other producers in the UK. Export to the Republic of Ireland is not considered as transnational transfer of waste for disposal is contrary to EU policy, there is no incineration or power plant to take poultry litter in any event and there is no apparent beneficial landfill disposal option over that potentially available in Northern Ireland or the UK.

10. Alternative technological solutions have been suggested by objectors to the scheme proposed by Rose, all of which together with a number of other techniques, with the exception of Quick Wash, have previously been investigated in the Invest NI supported study for the industry, the technical study which underpins the EGAUM report and recommendations and the SNIFFER study.

Those alternative suggested technologies are:

- Anaerobic digestion
- Quick Wash
- Pyrolysis
- Gasification
- Autoclaving
- Pelletising for use as a fertiliser

11. None of these alternative technologies have been commercially trialled using poultry litter, except for forming poultry litter into pellets for sale as a fertiliser. In the instance of pelletising, there is a need to establish a market and experience in the USA is that the single large plant operating there is not operating at full capacity and its markets are primarily in the leisure industry, notably golf courses; pelletised chicken manure, or in some other form, will always have to compete with other more nutrient rich and more easily handled fertilisers.

12. In response to a consultation by The Planning Service, DARD has recently provided via its expert advisors, the Agri-Food and Bio-Sciences Institute (AFBI), a review of the alternative technologies put forward by objectors to the Rose Energy scheme. The AFBI report with that consultation response concludes:

> *"AFBI therefore concludes that there is no evidence or recent information that would alter the original conclusion of the EGAUM Technical Report (published in 2005) that a centrally located combustion plant is a viable alternative use for poultry litter in Northern Ireland".*

13. It is concluded, therefore, that there is no viable alternative option, or current tested technology, to that proposed by Rose Energy for the use of poultry bedding as a bio-mass fuel in the production of energy in a single power plant. This was the view expressed in the reports produced by the three independent bodies and which formed the basis of the proposal by Rose Energy Ltd to submit a planning application for the development of a poultry bedding and MBM fuelled bio-mass power plant on the site off Ballyvannon Road, near Glenavy.

1. INTRODUCTION

1.1 This report has been prepared by The Graham Bolton Planning Partnership at the request of Rose Energy Ltd, the applicant for the proposed bio-mass fuelled power plant at Ballyvannon Road, near Glenavy. This report has been prepared pursuant to the request under Regulation 15 of The Planning (Environmental Impact Assessment) Regulations (Northern Ireland), 1999.

1.2 The planning application and accompanying Environmental Statement was submitted on 4 June, 2008, following an extensive Environmental Impact Assessment. Following consultations by the Planning Service of Northern Ireland, a request was made under Regulation 15 of The Planning Environmental Impact Assessment Regulations (Northern Ireland) 1999 for further information to be submitted in respect of a number of matters.

1.3 Initially by letter dated 11 February, 2009, ("the Regulation 15 letter") a request was made for an "Economic Appraisal" to be submitted, and subsequently amended by the Planning Service's letter dated 17 February, 2009, ("the Regulation 15 Amendment letter") and amended and clarified further at a meeting with The Planning Service and representatives of the DoE Economic Branch held in the offices of The Planning Service on 4 March, 2009.

1.4 At the meeting on 4 March, 2009, it was agreed by representatives of the DoE Economics Branch and The Planning Service that the assessment should not be an "economic appraisal" but of the potential options for dealing with, use or disposal of poultry litter. Further, it was agreed at the meeting on 4 March, 2009, that consultants retained by Rose Energy Ltd would prepare this Options Appraisal report, drawing upon information available from Rose Energy Ltd and its constituent joint venture companies, O'Kane Poultry Ltd, Moy Park Ltd, and Glenfarm Holdings Ltd, where the expertise and knowledge lies in respect of alternative options other than alternative technological

options. This request for an "options appraisal" was confirmed by The Planning Service in their letter of 31March, 2009, amending the original request in the Department's letter of 11 February, 2009, and which specifically refers to the clarification within the Regulation 15 Amendment letter.

1.5 That additional clarification is in four itemised paragraphs of the Regulation 15 Amendment letter, the first two being statements (to which further reference is made later in this report). The third itemised paragraph refers to an alleged absence of information that demonstrates that the proposed power plant is the **only** means (emphasis within the letter) of dealing with the problem of poultry litter and excess phosphorous in particular and seeks an assessment of all potential options and draws attention, by way of example, to landfill, exporting poultry litter to the UK and different technological options.

1.6 A full Economic Appraisal of the proposed biomass fuelled power plant project has been submitted to the Government as part of an application for grant assistance. That Economic Appraisal contains confidential information which is exempted from disclosure under the Freedom for Information Act. The economic case for the proposed development is the subject of a separate appraisal by Government and its advisors.

2. THE SUBMITTED PLANNING APPLICATION AND ENVIRONMENTAL STATEMENT

2.1 Rose Energy Limited proposes to build a biomass fuelled power plant on a site off Ballyvannon Road, near Glenavy, adjacent to the rendering plant of Ulster Farm By-Products.

2.2 The proposal is for a 100MWe thermal input power plant using poultry bedding and meat and bonemeal (MBM) as the fuels; poultry bedding is the mixture of poultry litter and the bedding upon which poultry is reared. The plant will produce 30MWe electrical output, of which approximately 25MWe will be exportable to the NI grid. Approximately 220,000 tonnes of poultry bedding from broiler production and 40,000 tonnes of MBM will be used with the adjacent Ulster Farm Rendering Plant being the primary source of the MBM, which is currently exported from that plant to England and Wales for use as a fuel in power plants and cement kilns, or landfill in Scotland.

2.3 There is an urgent requirement to deal with the problem of poultry litter. Along with other manures from intensive livestock rearing, excessive nutrients are being applied to the land which is causing water quality problems, engendering degradation of bio-diversity in water bodies and has a distinct adverse visual impact in the form of algae blooms. Lough Neagh is hyper-eutrophied and water bodies and resources which are presently satisfactory are at risk of eutrophication and degradation. There is insufficient nutrient deficient land in Northern Ireland to continue past practices and accommodate spreading of all the livestock manures. Furthermore, it is identified that phosphorous is the main nutrient which is in particular excess.

2.4 The Nitrates Directive requires action to reduce the excessive application of nutrients, which includes a winter closed period when application of fertilisers is not allowed and consequent need to store manures during that period. The previously agreed arrangement

with the European Commission to allow for over-winter field storage of poultry litter came to an end in December, 2008, and agreement is being sought for its extension until the end of 2010. However, the problem of insufficient nutrient poor land to spread poultry litter remains and any "derogation" is only temporary and only deals with the problem in terms of temporary storage. Paragraphs 5.7-5.14 of The Planning Statement which accompanied the submitted Planning Application provides a detailed resume of the Nitrates Directive and the Northern Ireland Government's review and identification of problems; the relevant extract from The Planning Statement is appended at A. The Regulation 15 Amendment letter, reciting the views expressed by the Economics Branch of the DoE, recognises the problem facing the poultry industry, the need to find an alternative solution to land spreading, and the significant costs that this could entail to an industry which is of substantial value to the local economy.

2.5 Subsequent to the establishment in 2002 of the DoE-DARD Scientific Working Group, three independent studies were conducted with the aim of investigating and advising on appropriate solutions for dealing with excess manures, including poultry litter, the spreading of which on agricultural land would be greatly restricted following the introduction of the Nitrates Directive and the subsequent Regulations restricting the application of phosphorous in fertiliser. The detailed conclusions and matters reviewed by the Government initiated studies[1] are given in The Planning Statement accompanying the Planning Application at chapter 5, and reference is also made in that chapter to the NI Invest supported independent report produced on behalf of the poultry industry which specifically referred to the interests of that industry rather than the wider concerns of all types of manure, their use and disposal. These three independent reports all concluded

[1] The Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) Report entitled "Methods for Disposal or Processing of Waste Streams from Intensive Livestock Production in Scotland and Northern Ireland", prepared for the Environment and Heritage Service and the Scottish Environmental Protection Agency, May 2005, and the report of the Expert Group on Alternative Use of Manures (EGAUM), entitled "An Evaluation of Manure Treatment Systems Designed to Improve Nutrient Management", December 2005

that combustion of poultry litter for energy production is the appropriate solution for the future use or disposal of poultry litter.

2.6 The recommendations of EGAUM were endorsed by the then Minister. Dr George McIlroy[2], the Chief Executive of the Agri-Food and Bio-Sciences Institute, formerly part of DARD, responded to the pre-application consultation by GBPP Ltd. In his letter of 2 February, 2007, he records the endorsement by the DARD Minister of the EGAUM recommendations, which included for a single poultry-littered fired generator capable of handling 300,000 Te per annum and producing up to 25 Me of power – see paragraph 3.8 of The Planning Statement and also a copy of the letter appended at B and which was also appended to the Consultation Statement submitted with the Planning Application.

2.7 It is in the context of the Nitrates Directive and consequent regulations, the review of the DoE-DARD Working Group and the subsequent three independent studies and their conclusions that the project for a single poultry bedding and MBM fired electricity generation plant was developed and submitted in June 2008 for planning permission, with the accompanying Environmental Statement.

[2] Dr George McIlroy was The Chief Scientific Officer of DARD and Chairman of The Expert Group on Alternative Uses of Manures (EGAUM)

3. OPTIONS APPRAISAL

3.1 The proposed power plant at Glenavy for Rose Energy Ltd would be fuelled by both poultry bedding and meat and bone meal, the latter primarily sourced from Ulster Farm By-Products' rendering plant at Glenavy. The options for the use of the respective different materials are different, but it is unnecessary to consider those for MBM in this report. There are current solutions and uses for MBM and the intended use of this material as an additional fuel in the proposed Rose Energy plant does not affect the options for the use or disposal of poultry litter. The use of MBM, which is currently being exported to the UK as a fuel, does enhance the economics of developing and operating a bio-mass fuelled power plant but is not determinative of that being the chosen option. The potential availability of MBM is coincidental to the need to find a solution for poultry litter and given the chosen option it is economically preferable to use this local resource to the benefit of the Rose Energy scheme and the poultry industry as well as benefitting Northern Ireland's need to diversify from reliance upon imported fossil fuels for power generation and in the interests of reducing energy induced green house gases.

3.2 Poultry Bedding – Options Appraisal

3.2.1 The options for dealing with, using or disposal of poultry bedding are:

- Continue spreading on land
- Disposal to landfill site
- Export to the United Kingdom for use as a fuel in power plants, or disposal
- Technological solutions

3.2.2 The option of simply closing down the poultry industry in Northern Ireland is not canvassed here. Closing down the industry would be a consequence of not being able to find a viable solution for the future use, treatment or disposal of poultry bedding. It is an "option" which would result in the destruction of 7,000 jobs directly related to the industry, and many thousands more dependent on the industry, and a substantial negative impact upon Northern Ireland plc. It is noted that this is, however, an option canvassed by some individual objectors to the current proposals which are the subject of the Planning Application.

3.2.3 The option of exporting material for disposal does not include export to the Republic of Ireland or any other country. Firstly, this would be contrary to European Union policy that "wastes" should not be exported to other countries in the EU or elsewhere but be treated, recovered or disposed of in the country of origin and also close to the point of origin. Secondly, there is no incineration facility for mass burn, power plant use or other facilities where poultry litter could be used as a fuel in the Republic. Thirdly, while the poultry industry has no experience or knowledge of disposal by landfill in the Republic of Ireland, there is no apparent financial advantage to landfilling in that country than there is to landfilling in Northern Ireland or the UK.

Continued spreading

3.2.4 Continued spreading of poultry bedding (poultry litter together with the bedding used, normally wood shavings) is not an option. The advent of a closed season over winter, scheduled to be introduced from October 2009, restricts the period when spreading can be undertaken. Not only do most poultry farmers not have land of their own which is available for spreading, having to find land elsewhere, but spreading poultry litter during the open period would compete with other manures for application and notably cattle slurry. Additionally, most producers do not have the space to store poultry litter during the close season which would, in any event, compromise bio-security.

3.2.5 The assessment of the feasibility of continued spreading can be summarised from an estimate made by the Ulster Farmers' Union, and which is referred to at paragraph 3.3 of The Planning Statement:

> *'Continued spreading of poultry litter is not an option. Ulster Farmers' Union has estimated that to meet the Phosphorus balances of no more than +10kg P/ha/year by 1 January 2010, reducing to a maximum of +6kg P/ha/year by 1 January 2012, would require around 14.59 hectares per 1000 broilers with no other slurry being spread on the land. This equates to the Northern Ireland poultry industry requiring 300,000 hectares to comply. This is not feasible.'*

3.2.6 One of the conclusions of the SNIFFER report confirms the position:

> *'In Northern Ireland the problems (with manure management) are particularly acute; there is insufficient land of low nutrient status to accommodate land spreading of manure, and difficulties are compounded by the geographic concentration of intensive pig and poultry units.'*

3.2.7 As referred to earlier, it is noted that the Regulation 15 Amendment letter records the views of the Economic Branch of the DoE and acknowledges that there is a need to find an alternative to spreading in addressing the problem of poultry litter use or disposal – it is implicit in this that there is no "do nothing option" of continued spreading.

Disposal to Landfill

3.2.8 For this to be a viable option requires there to be sufficient space for landfilling on a long term basis and that it can be achieved at viable cost. As with all means of alternative use or disposal of poultry bedding, the material will have be transported from the disparate sources of the material and it is assumed, therefore, that wherever the point of use or disposal might be within Northern Ireland those transport costs would be similar; chapter

17 of the Environmental Statement refers to the different transport "costs" in terms of carbon footprint associated with the continued spreading of poultry bedding against its use as a biomass fuel in the proposed power plant at Glenavy.

3.2.9 A full study of the long term availability of landfill space to accommodate the annually produced poultry bedding has not been undertaken, though Rose Energy Ltd has undertaken a review of available landfill space to accommodate disposal of ash from the proposed power plant. This review has indicated that there is limited availability of landfill sites within Northern Ireland. The available space will continue to be the primary means of disposal for municipal waste until such time as a long term solution for its disposal, associated with the continued efforts for reducing, reusing and recycling such waste, are approved and put into effect; the current timetable proposed by Arc 21, the local authority consortium with the responsibility for the largest quantity of municipal waste in Northern Ireland, indicates that a solution including Energy from Waste will not be in place until Spring 2014.

3.2.10 Whether or not landfill space is, and would continue to be, available – and also assuming that it is acceptable to the owners of the landfill sites given the nature of the material, its potential for odour and inherent disease risks including botulism – the financial implications of landfilling are overriding and conclusive.

3.2.11 Using a general landfill rate recently obtained for disposal of inert material in Northern Ireland, and taking no regard of the likely uplift in rates for disposal of a material such as poultry bedding, landfill disposal costs would be approximately £35 per tonne, exclusive, or £7.7m per annum – a comparative cost for long term disposal in the UK may be as low as £11 per tonne, again exclusive; this figure will fluctuate over time, of course, and will also be sensitive to the demands of the public sector for municipal waste disposal and the continued availability of landfill space. Landfill Tax, however, is the crucial and determininitive cost.

3.2.12 Landfill Tax is currently (2009) payable at a standard rate of £40 per tonne and scheduled to escalate to £48 per tonne in 2010. This equates to a cost of £10.5million per annum (2010) for the poultry industry simply in taxation costs alone, excluding the landfill charge to operators of the sites. In the Budget announcement of Wednesday, 22 April, 2009, the Chancellor announced that the standard rate of Landfill Tax will continue to escalate post-2010 at a rate of an additional £8 per tonne per annum until 2013. Based on the recently obtained cost for disposing of inert material, there would be a current combined cost of £75 per tonne, exclusive of transport and VAT, for disposal of poultry litter by landfill in Northern Ireland, or £16.5m per annum, exclusive, at current day prices. Any additional costs, let alone one of such magnitude and which will continue to grow, cannot be sustained by the poultry industry in Northern Ireland. The competitive position of the industry in Northern Ireland has to be compared, initially, with that in the UK where a substantial proportion of broiler chicken litter is utilised as a fuel in power plants or where spreading remains an option in the large arable farming areas and where there are not the problems resulting from concentrated poultry production in an area of limited arable production.

3.2.13 Poultry litter in the UK is potentially of value to the farmer. Poultry litter provided as a fuel supply to a power plant has a farm gate value. This is variable with values between approximately £3.50 and £1.50 per tonne depending upon the dryness of the poultry litter – poultry litter with moisture content of 40% would be at the bottom end of this scale. It would be wrong to assume that that would be a consistent market value given that there are currently many long term contracts, and it has previously been the case that the producer of poultry litter would be required to pay a "gate fee" – this is a payment to the power plant operator to "dispose" of the poultry litter as a fuel. As these long term contracts mature and determine, the market price for poultry litter for use as a fuel will clarify but it is expected that in general this will result in there being a least a nil cost to the farmer and possibly a positive value to the farmer given the drive for "green"

electricity and the recent confirmation that the use of such fuel will attract 1.5 x Renewable Obligations Certificates (ROC's) or 2 x ROC's if the poultry litter is combusted in a combined heat and power plant which utilises/reclaims 80% of energy input.[3]

3.2.14 It is concluded that landfilling is not a viable prospect for the poultry industry in Northern Ireland. In Landfill Tax alone, this would cost the industry over £10.5 million if this were the route of disposal in 2010-11 increasing by a further £8 per tonne in each of the years 2011-2013, resulting in the latter mentioned year of a standard rate Landfill Tax of £72 per tonne or an annual cost to the poultry industry in Northern Ireland of almost £16 million per annum in tax alone. The purpose of the Landfill Tax should not be overlooked – as stated in the Budget Report[4], the Budget 2009 announcement to continue to increase the standard rate of Landfill Tax is *"...so that the tax continues to incentivise investment in more sustainable alternatives to reduce reliance on landfill, delivering emissions savings equivalent to 0.7MtCO_2 per year"*.

3.2.15 By 2013, when the Rose Energy plant should be fully operational and contributing to the electricity needs of Northern Ireland, the cost to the poultry industry of disposal by landfill would be in excess of £23.5m per annum even assuming that the landfill cost element remains constant. This is not a cost that the industry can in any way contemplate – landfill is not a viable option.

[3] DETI have confirmed their final policy outline in the "Outcome from the Statutory Consultation on the Renewables Obligation Order 2009".

[4] See paragraph 7.61 of the Budget Report, 2009, *"Economic and Physical Strategy Report and Financial Statement and Budget Report"*, April 2009

Export to UK

3.2.16 Exporting poultry bedding to the United Kingdom is simply a means of accessing two options for disposal or use, namely disposal to landfill or use as a biomass fuel. The former is no more a realistic or viable option than it would be in Northern Ireland and would simply add the considerable transport cost of shipping poultry bedding by sea to the UK. It is appropriate to record that long term contracts for disposal of material in the UK can be as low as a little over £70 per tonne, inclusive of both the landfill disposal cost and Landfill Tax together with transport but exclusive of VAT, at which rate it is competitive with estimated current costs for disposal in Northern Ireland; this does not, however, make it a viable alternative.

3.2.17 Moy Park has shipped poultry bedding to EPR's plant at Westfield, Fife, for use as a fuel. While the amount has been variable, up to 150-200 Te per week has been shipped where it has been used as a top up fuel to meet the particular demands of that plant at various times in the year. However, there is no long term solution for shipping the poultry bedding output of the Northern Ireland industry to the UK for use as a fuel. There is simply not the capacity of appropriately designed plants in the UK to take the material – current poultry fuelled power plant capacity in the UK is approximately 600,000Te per annum, with in excess of 1million tonnes of poultry bedding produced annually in the UK, and could not accommodate the 220,000Te disposal requirement for the Northern Ireland poultry industry. Moreover, poultry bedding from Northern Ireland will always be at a competitive disadvantage to supplies originating in the UK because of the additional transport costs involved.

3.3 Technological Solutions

3.3.1 The technological options for disposal or use of poultry bedding have been extensively canvassed within the three independent reports referred to in Chapter 2. Additionally, just prior to the initial completion of this Options Appraisal report, DARD responded to the consultation request of The Planning Service to comment upon the suggested alternative technologies put forward by objectors to the Rose Energy proposal; these alternative technologies are within a document entitled "Protecting the Future" compiled by Professor Sir George Bain, Mr Michael McHugh and Ms Aileen Smith, who are objectors to the Rose Energy proposals. A copy of DARD's report and response, prepared on its behalf by their expert advisors The Agri-Food and Bio-Sciences Institute (AFBI), to the claimed alternative technologies is appended at C, and reference made to it below.

3.3.2 To be viable as an option, the technology must:

- deal with the nitrates and phosphates which are the basis of the problem of having to find alternative means of disposal or use of poultry bedding; the technology must deal with them directly or via secondary technology or application;
- be proven at similar commercial scale treating poultry litter/bedding; technologies which are unproven have major uncertainties and thus to the ability to raise capital, if at all, and service the debt;
- have established means of disposal or markets for by-products; and
- be financially viable; there are technologies which may deal with the nitrates and phosphate issues but where the economics of operation are poor and inadequate to service any return on capital or, indeed, attract senior debt.

Anaerobic Digestion

3.3.3 This is a technology which has been suggested by some objectors as a realistic technology for poultry bedding. Anaerobic digestion is a natural process whereby a culture is grown in a nutrient rich liquid medium in the absence of oxygen. This results in a higher calorific gas which can be used in a stationary engine on site or collected as a gas for use elsewhere. This higher calorific gas is a mixture of methane and carbon monoxide, as a result of which other chemicals such as nitrogen and phosphorous pass through the process. As a consequence, this technology does not address the basic issue and problem of poultry bedding in that it does not deal with the nitrates and phosphates and there remains a disposal problem for residual material.

3.3.4 The practical problem of utilising poultry bedding from broiler production in anaerobic digestion is that though it has a moisture content of around 40%, this is insufficient for this technology. For the process to work at its optimum rate it would be necessary to add liquid to poultry bedding giving a fivefold increase in volume. Consequently, instead of there being in the order of 220,000 Te of poultry bedding to deal with per annum there would be in excess of 1 million Te of a more dilute material to be processed, at the end of which there would still be a substantial residue which has to be disposed of due to the presence of nitrates and phosphates. By contrast to its use as a suitable means of dealing with poultry bedding, anaerobic digestion is an appropriate technology for use with slurry material and the EGAUM report recommended its application for dealing with pig slurry.

Quick Wash

3.3.5 This is a technology which it has been recently suggested could be applied to poultry litter - is at yet untried and untested. The process is aimed at municipal wastes in the main which when cleaned in this manner allows there to be more effective recovery of

materials from the waste – metals and plastics can be more easily recovered in a "clean" state allowing better prices to be achieved for recovered materials.

3.3.6 Phosphorous is a potentially valuable element, present in poultry litter, which can be recovered using "Quick Wash" with an appropriate acid, leaving depleted but still nitrogen rich poultry litter – the phosphorous would be recovered from the dilute wash and the wash itself neutralised. The problem of disposing of the phosphorous depleted poultry litter would remain in the face of the Nitrates Directive, the neutralised wash would need to be disposed of and the recovered phosphorous in the form of calcium phosphate could be used as a fertiliser but would be competing with chemical fertilisers; also it is not clear from American experience that the recovery of calcium phosphate is economically viable. This technology is referred to in DARD's recent consultation response to alternative technologies put forward by the objectors to the Rose Energy scheme.

3.3.7 It is not known how this new process would benefit the disposal or reuse of poultry bedding and no such untried technology at commercial scale, and with major uncertainties about use or disposal of by-products, could be funded.

Pyrolysis and Gasification

3.3.8 These can be grouped together as they are both processes to drive off the combustible gas by the application of external heat and to collect it for a separate use; pyrolyis is carried out in the absence of oxygen while gasification is in an oxygen starved environment. In any combustion process the fuel needs to be in a gaseous form and by heating solid or liquid fuels to allow them to vaporise releases the gaseous form which can then be ignited. This can, for example, be seen in a domestic coal fire where there is a small region between the coals and the flame which is where the combustible gas from coal under heat is produced.

Pyrolysis

3.3.9 This process produces 15% bio-gas and 50% bio-fuel. It also produces a residue in the form of a "char" – a mixture of ash and charcoal – of approximately 25% of the volume of the original material which may be used as a dilute fertiliser. The "char" would be subject to the regulatory controls on the application of fertilisers and it would be in competition with other fertilisers, which are higher in nutrient value, more easily handled in the case of chemical fertilisers and of known benefit and cost of application.

3.3.10 A locally based firm, D-Engineering, has recently claimed (April 2009) that it has licensed from a Canadian company portable (1Te per hour) and semi-portable (50Te per hour) pyrolysis technology and that 15 or so semi-portable plants would be sufficient to deal with the poultry bedding output of the Northern Ireland industry and at half the cost of the Rose Energy proposals. This is a commercially untested technology and there has only very recently been contact between this Company and representatives of the poultry industry, where the market lies for this new technology. The Company has stated there is as yet no working example of this portable technology.

3.3.11 A review of the technology as applied in this portable or semi-portable mode indicates that the raw material, poultry litter, is assumed to have 25% moisture content, which is then dried to 15% moisture content before the pyrolysis process. Broiler litter has approximately 40% moisture and it is unclear whether the technology would be capable of handling material with that level of moisture content, or whether the poultry litter would have to be supplied partly pre-dried, with the considerable costs that that would involve. It is also apparent that there would be considerable handling costs, particularly in labour. The derived bio-oil is not a straightforward product which can be used or sold but would have to go through gasification or other further treatment to create useable products; the proponents of this technology envisage a centralised facility for treatment

and/or burning. The "char" would constitute approximately 37% of the original raw material by weight which would be high in nitrogen which would need to be disposed of.

Gasification

3.3.12 Success with this process has been disappointing, certainly in the western world, although there are some encouraging reports from Japan in the use of non-biomass fuels. In Europe there is one company which has developed a series of gasification units which are successfully treating municipal wastes. These plants are up to 40,000 Te per annum capacity using MSW and to apply this technology to poultry bedding would require several plants to be developed as there is no known successful application of larger scale plants.

3.3.13 While gasification appears to be a promising new technology there is no known off-the-shelf technology available to deal with poultry bedding and no commercial experience that such technology applied to this material would successfully, as well as viably, treat poultry bedding and the nitrates and phosphates issues

3.3.14 However, enquiries have been made of the company which has developed these gasification units which has informed Rose Energy Ltd that they have no experience of dealing with chicken litter and therefore are unable to confirm whether this technology could be successfully applied to this material. Consequently, it is an unproven technology for treating poultry bedding and at the scale required.

Autoclaving

3.3.15 This is also a process using heat and pressure which, when sufficiently applied, will produce a sterile and less bulky end material. It is, again, a technology which is potentially well suited to municipal solid wastes (MSW), cleaning them and allowing for more easy separation and recovery of materials for recycling and reuse. Its use in treating

poultry bedding is both unknown and unclear and could only effectively be a drying and sterilising process without the benefits which accrue in treating MSW in this fashion. Discussions with the proprietor of a local firm, Re3 Group, which has successfully developed an autoclave facility in Limerick in the Irish Republic, confirms that this technology has not been commercially trialled with poultry litter; it is unclear, therefore, how this technology would work in practice using poultry litter as the raw material and what benefit would derive from using the process.

3.3.16 Autoclaving applied to poultry bedding would result in significant quantities of water being driven off with a high biological oxygen demand (BOD) and ammonia which would require an advanced two stage effluent treatment plant to create an effluent which will be allowable for discharge to a watercourse. Additionally, such treatment plant would result in a high degree of malodorous air being produced which would need to be treated, potentially by using a thermal oxidiser, to abate potential nuisance. Both the water treatment plant and thermal oxidisation equipment are expensive to both acquire and operate which would indicate that a single site solution would be appropriate if this technology were to be applied to poultry bedding. Both of these considerations may also apply to the use of Quick Wash technology.

3.3.17 It is estimated that the capital cost of such an autoclaving plant – inclusive of site, project costs, civils, materials handling and abatement/effluent equipment – would be in the order of £45M, a significant saving on the capital costs of developing the proposed Rose Energy Power Plant. However, operating costs would be in the order of £8M, before depreciation, of which the biggest component is fuel oil estimated at £5M per annum.

3.3.18 Sterilising poultry bedding by autoclaving would remove the disease risks to farmers using it as an alternative fertiliser; however, the inherent problems of finding a market would remain. Based upon the constituent chemical nutrients in poultry bedding, there might be a theoretical value of between £64 and £87 per tonne, though it would be

expected that it would have to be sold at discounted cost to obtain a market. At the higher value level this would amount to just £9.6m of income per annum, based upon 110,000 Te per annum of output material from autoclaving, but there would be the higher capital and operating costs entailed of dry stores for over-winter storage for this bulky material, to add to the costs referred to above; this does not provide much margin above operating costs to attract and service capital debt, and at the lower level of theoretical value (£64) would be significantly lower than operating costs. Additionally, farmers would need different equipment to that generally used for spreading fertiliser, other material would need to be added to it to dilute the phosphorous content, and in overall terms of nutrient value four times the volume would need to spread to match the equivalent artificial fertiliser.

3.3.19 However, the autoclaved material would still be rich in nitrates and phosphates and would be of little use in Northern Ireland farming, as pointed out by the EGAUM Technical Report. As there is no established market for such material, there can be no certainty as to what value this material would attract as a fertiliser. Not only would it be bulkier, nutrient value for nutrient value, than artificial fertilisers but also competing with the ash which results from the incineration of poultry bedding which is sold as a fertiliser from the poultry litter burning in the United Kingdom. As with poultry manure pellets, in the absence of a known market, and thus potential values, no realistic and viable project which would attract funding could be drawn up.

Pelletising for use as a Fertiliser

3.3.20 Poultry bedding has been and continues to be used as a fertiliser by spreading on fields. As noted earlier, it is the excess of nitrates and phosphorous in particular on land which is not nutrient poor which has caused a problem and which is deleteriously affecting water supplies.

3.3.21 Poultry bedding from broilers is 40% moisture and if the moisture can be removed then the material is more easily and cost effectively transported as well as applied. Pelletising is one such possibility, which requires the mechanical dewatering of the poultry bedding with some heat treatment followed by compression through dyes or moulds to create the pelletised material.

3.3.22 A reference plant producing pelletised chicken manure has existed in the USA for over seven years. However, it has never reached its full potential, running under capacity. Anecdotal evidence suggests that the agricultural end users prefer artificial fertiliser as it is easier to spread but also because artificial fertilisers are completely free from diseases such as botulism. Unless diseases such as botulism can be guaranteed to be removed from the raw material, then any end product to be used as a fertiliser will always be at a disadvantage to other forms of fertiliser, except where bio-security is not an issue. It is understood that the output of the plant in the USA is predominantly used as a fertiliser for golf courses.

3.3.23 Pelletising of poultry bedding was one of the technologies reviewed by the EGAUM Technical Working Group which reported to the Expert Committee. Inherent in that review was the difficulty in identifying a market for the pelletised material, within the context of it being a competing product to other fertilisers, both natural and artificial, and the problems of dealing with botulism and other potential diseases within the raw material.

3.3.24 The EGAUM Technical Report refers to the possibility of pelletising[5] but this would be of a dried cake extract after centrifuging manure (including poultry manure) to remove the excess moisture. The Technical Report notes that high quality pellets requires relatively high cost equipment, that there is no market yet established in this country, and

[5] Paragraph 4.1.2 of EGAUM GRU Report, December 2005

also that while there is a North American company, Agri Recycle (now known as Perdue Agrirecycle), which has developed pelletising technology for processing poultry litter, that technology is on a large scale requiring a 16 hectare (40 acre) site. However, as the report also points out there is a need to remove phosphorous in particular from fertiliser and the production of a fertiliser, albeit in pelletised form, which is still phosphorous rich is of limited benefit to Northern Ireland farms and such a product would therefore have to be exported.

3.3.25 The independent reports reviewed other technologies, both established and novel, to those referred to above together with a number of turn-key solutions from commercial suppliers. None of these other technologies could on investigation demonstrate technical and commercial viability and achievable solutions for dealing with poultry litter.

4. CONCLUSIONS

4.1 This Options Appraisal report was requested by the Economics branch of the DOE and as part of the Regulation 15 request for an Addendum Report to the Environmental Statement. It does not seek to demonstrate the viability or the economics of the proposed plant for the use of poultry bedding, together with meat and bone meal, as a biomass fuel in a power generation plant.

4.2 The decision of the company to pursue the option of a single poultry bedding and, later, MBM fired power plant, followed the reporting of three independent research studies – two sponsored by Government and the other supported by a Government Agency (Invest NI) – which recommended that the appropriate solution for dealing with the nitrates and phosphates rich poultry bedding is by using it as a fuel in power generation, a solution which is successfully and viably applied in the United Kingdom, Europe and North America.

4.3 The options for the poultry industry in Northern Ireland are essentially to either landfill material, export it to the UK for either landfill disposal or use as a fuel, or to find a technology within Northern Ireland which is viable and which does not put the Northern Ireland poultry industry at a disadvantage to the industry elsewhere in the United Kingdom with which it primarily and initially competes. The simple economics of landfilling, and in particular the Landfill Tax, the standard rate of which will continue to escalate until 2013, demonstrates that this is not a realistic or viable option for the industry even assuming that there is landfill space available on a long term and substantial scale. This conclusion applies whether or not poultry bedding is landfilled in Northern Ireland or in the UK.

4.4 Similarly, there is no short or long term solution in exporting poultry bedding to the UK to use as a fuel in power generation plants. There is not the capacity within the UK for dealing with the Northern Ireland poultry output. The plants in the UK currently have a capacity in the order of 600,000 Te per annum and while a small, but variable, quantity of poultry bedding is exported for Northern Ireland for use in the Westfield plant at Fife, there is no possibility that the UK power plant capacity can be expanded by some 30% to accommodate the annual Northern Ireland poultry bedding production or compete with UK derived supplies. In any event, if it is useful as a fuel then there is every reason for it to be utilised in Northern Ireland which has some of the highest electricity charges in the country and is most dependent on imported fossil fuels for its power needs.

4.5 In a speech on 24 April, 2009, Energy Minister Arlene Foster endorsed higher levels of power generation from renewable sources and development of the electricity grid. The Minister was speaking at the International Council on Large Electric Systems (CIGRE) Seminar on "Low Carbon Power Systems" in Belfast. In the opening address at the seminar, Arlene Foster said: *"Increasing the level of renewable power generation is key for Northern Ireland's energy future, and this will involve significant strengthening of the electricity grid. It is not sustainable to continue our near 100% dependence on imported fossil fuels for power generation.*" She continued: *"This is an important time as we consider our energy mix and key energy priorities for the future. In order to help make Northern Ireland a more prosperous region, we must have reliable and competitive energy supplies. The challenge will be to ensure that these are delivered in the most cost effective manner".*

4.6 The recent response by DARD via their letter of 27 April, 2009, and the accompanying report prepared on the Department's behalf by The Agri-Food and Bio-Sciences Institute (AFBI), restates the conclusions of the EGAUM report and also the views expressed by AFBI to the Agriculture Committee at a presentation held at Stormont on 3 November, 2008, that there is no new, alternative and tested technology to that proposed by Rose Energy of using poultry bedding as a fuel in an electricity power plant. Specifically, the DARD expert report concludes:

> *"Having considered the alternative technologies suggested by objectors to the Rose Energy application... the following conclusions can be drawn:*
>
> *"In addition to its use as a fertiliser and as a fuel source, a number of alternative proposals for obtaining added value from poultry litter have been identified. However, all of these alternatives can be characterised as being at various stages of development and testing and none has been integrated into commercial poultry production. Some of the technologies could be applied at farm level, but those which involve combustion would need to address the associated issue of environmental emissions. The cost of the technology required to do this may be prohibitive at farm level.*
>
> *"A key factor in all of the alternative technologies proposed is to identify suitable outlets for the end products of the process, which, for most alternatives, has been barely addressed. In addition, from a bio-security perspective, removing poultry litter entirely from the farm is the best way of reducing the risk of spreading disease.*
>
> *"AFBI therefore concludes that there is no evidence or recent information that would alter the original conclusion of the EGAUM Technical Report (published in 2005) that a centrally located combustion plant is a viable alternative use for poultry litter in Northern Ireland."*

4.7 It can be concluded from the evidence, supported by the conclusions of other independent bodies, that there is no viable alternative option, or current commercially tested technology, to that proposed by Rose Energy for the use of poultry bedding as a biomass fuel in the production of energy in a single power plant.