

Andrew Godley

Principal Consultant - Waste Management & Resource Efficiency

Ricardo Energy & Environment



Qualification(s) *PhD, QMWC London University, 1991
BSc Applied Biology, NELP, 1979*

Nationality *British*

Language(s) *English (Mother Tongue)*

Profile

Andrew joined Ricardo Energy & Environment in 2008 and is our leading expert on biological waste treatment systems. Andrew is an experienced microbiologist with 40 years' experience and holds a Ph.D. in anaerobic microbiology. He is a highly experienced environmental scientist in all aspects of microbiological activities associated with environmental issues, waste and wastewater treatment, and soil and groundwater protection. Prior to his career in consultancy, Andrew spent 25 years with Shell Global Solutions primarily undertaking microbiological based commercial research and development, including waste water treatment research and technical service at several European refineries. Andrew is now a recognised industry expert in the biological treatment of waste and the application of products from organic waste treatment to land.

Prior to joining Ricardo, Andrew spent 7 years at WRc and was instrumental in developing Environment Agency mechanical biological treatment (MBT) monitoring guidance. He has extensive expertise in the operation and monitoring of different designs of MBT facilities with anaerobic digestion (AD) and aerobic composting (IVC). Since 2012, Andrew has been an expert witness in relation to aspects of the design and performance of a number of recently constructed MBT facilities where the expected performance has not been achieved to advise on significant insurance claims. This has included both MBT-AD and MBT-IVC variants and in each case involving disputes between parties including the construction contractor, technology sub-contractors, operators and legal representatives. In relation to one of these roles, Andrew was the named expert in relation to determining the causes of high ammonia emissions in exceedance of the permit limit, involving a detailed review of SCADA data, process design information and design concept for emissions control, and other operational data including waste composition.

In addition to acting as longstanding expert in commercial cases, Andrew has also acted in a number of criminal cases. A recent case related to an assessment of the causes of process issues at an AD facility, including damage to gas engines. Acting on behalf of waste companies that provided feedstock to the AD facility, Andrew examined the potential for contamination in the waste streams and whether this could have been anticipated by any of the parties. Andrew has also recently taken a key role in technical due diligence assessments of AD facilities with both food and agricultural waste feedstocks. Andrew recently led technical due diligence of a novel enzyme hydrolysis and AD process and has experience in reviewing a number of autoclaving thermal hydrolysis processes (THP) for the treatment of mixed municipal solid waste (MSW).

Andrew has a key role as procurement technical advisor to local authorities for MBT and AD facilities. He has supported Essex County Council since 2008 throughout the procurement of its 400Ktpa £4bn MBT facility to financial close and subsequently its biowaste treatment facilities, including wet and dry AD and in-vessel composting. Andrew continues to support ECC on post-commissioning performance monitoring and contractual disputes. Andrew also supported Cheshire East Council to complete a feasibility analysis for an AD scheme. Integral to several of these projects, Andrew has considered the quality and potential markets for the digestate and compost products. He is a member of the BSI AW/20 committee responsible for maintenance of BSI standards for growing media and related areas and has supported Defra in assessing agronomic benefits of recycling organic wastes to agricultural land.

Key Skills

- + Procurement of waste treatment processes
- + Mechanical biological treatment (MBT); production and quality of solid recovered fuel (SRF)
- + Waste management and waste characterisation
- + Biodegradation of organic wastes by composting and anaerobic digestion (AD)
- + Soil protection and application of organic fertilisers to land
- + Air emission treatment and environmental impacts of waste treatment

Selection of Project Experience

2015 - ongoing, MBT commissioning monitoring (Essex County Council)

Andrew is advising ECC on the performance of its residual waste MBT facility as it undergoes hot commissioning leading up to Acceptance Testing. This entails discussing the plant performance and operations of the facility with the plant operators and the technical advisors of the funding organisations. Follows extensive previous support to ECC on facility procurement. Andrew has subsequently led advice in a dispute process.

2012 - Present, Expert witness on MBT facility performance (Commercial client)

Andrew is currently acting as an Expert Witness on a case of recently constructed MBT facilities where the expected performance has not been achieved. This involves examining facility design, how it is operated, facility performance and monitoring evidence in order to provide expert opinion on cause of facility underperformance, especially whether this is due to design, operational error or some other factor. In this case Andrew was required to assess whether remedial measures are reasonable and proportionate and provide his opinion in an expert statement which has accompanied a letter of claim by the client to the designers of the MBT facility. Andrew has been required and provided to examine the response by the designers to the claim and provide a supplementary statement to accompany our client's response to the designer's response. Multiple aspects of the facilities have been considered in depth including performance of mechanical pre-treatment, preparation of feedstock for anaerobic digestion, anaerobic digestion and digestate processing, water management and effluent treatment, and air emissions. This study also includes technical examination of the validity of insurance claims associated with the facility and whether proposed future modifications of the future would be cost effective and lead to desired performance being achieved.

2016- Farm AD performance review (Wight Farm Energy)

Andrew has recently undertaken a review of the design, operation, feedstocks and performance of a farm based AD facility fed with energy crops as feedstocks. The review focused on assessing the productivity of the plant and whether this might be improved to increase biogas yield and therefore the revenues and profitability of the facility.

2016-ongoing, Expert Witness, AD Feedstock Quality Dispute (Holman Fenwick Willan LLP)

Andrew is the lead expert in this ongoing role relating to alleged offences by two waste management companies regarding the alleged supply of contaminated anaerobic digestion (AD) feedstock that is claimed to have caused AD processing issues, including damage to gas engines.

2016 Expert Witness, Trade effluent discharge consent prosecution. (DWF LLP)

Andrew provided an expert report on the contamination loads in a trade effluent discharged to sewer and its likely impact on a local waste water treatment plant. The effluent producer was being prosecuted by the water company for damages to their wastewater treatment works from alleged high levels of pollutants in the discharged effluent. The analysis indicated that the impact of the discharged effluent would have had a minimal impact on the treatment works. Consequently the severity of the charge made against the effluent producer was significantly reduced

2015 - ongoing, Expert Opinion on IVC leachate discharges to sewer (Commercial client)

Andrew is providing expert opinion on the production of leachates from 4 in-vessel composting (IVC) facilities with regard to whether the volumes and leachate composition are such as to cause breaches of the trade effluent discharge consents (TEDCs) to sewer for each site. This is in relation to whether or not there are design errors in the IVCs. This entails undertaking site visits to investigate the cause of the leachate production, assessing the leachate composition data and determining whether those responsible for negotiating the TEDC with the water company undertook sufficient due diligence with regard to the likely expected leachate quality.

2015 - ongoing, Expert Opinion on MBT effluent treatment plant performance (Commercial client)

Andrew is providing expert opinion on a case regarding the performance of a sequencing batch reactor (SBR) effluent treatment plant attached to an MBT facility. The effluent from the SBR is discharged to sewer under a trade effluent discharge consent (TEDC) and concerns have been raised on the capacity of the SBR. Subsequently the SBR design has been changed and Andrew has been assessing the likely performance of the new design in relation to meeting its required performance level and thereby the risks of the TEDC being breached by the new plant.

2015, Acquisition technical Due Diligence - Food waste AD (confidential investor)

Andrew undertook an acquisition due diligence assessment of an operational food waste AD facility. This includes a review of the AD process technology and original design and the feedstock specification element of the work which is being led by Andy. The assessment focusses on the operations and maintenance of the facility, review of the track records, performance against the Environmental Permit and all commercial agreements in place for supply of feedstocks and offtake of heat, power and digestate.

2015 - Due Diligence on Farm Based AD facility (confidential investor)

Andrew has recently undertaken a Due Diligence study for a developer for a proposed farm based AD facility. This included a review of the proposed facility design and its anticipated performance, a review of the mixed farm waste feedstocks and anticipated biogas production, an examination of the track record and robustness of the proposed technology including a site visit and detailed examination of a reference site. The farm facility proposal included gas to grid usage of the biogas, and application of digestate to agricultural land.

2015 - Due Diligence on novel enzyme based mixed waste treatment process (commercial client)

Andrew has also recently undertaken a Due Diligence study for a client of a novel waste treatment process involving enzyme processing as a pre-treatment for anaerobic digestion. This included attending and auditing pilot scale trials of the process using our clients' waste materials. The review included extensive consideration of how the process might be scaled up to full scale and the issues that this might cause and how these would be mitigated by the technology supplier.

2013 - 2015. Sewage Sludge Products (UKWIR - UK Water Industry Research)

Ricardo-AEA was commissioned by UKWIR to investigate the perceptions and barriers to the use of sewage sludge containing products. Andrew undertook a comprehensive review covering the UK, Europe and other major developed countries such as USA, Canada and Australia of the background to this project. Andrew collated current information on the quality and characteristics of sewage sludge products, the types of products and how they are made, the amounts of different products produced and how they are used, and reviewed the regulation of the use of such products in these countries.

2013 - 2014. Anaerobic Digestion options for food and green waste (Cheshire East Council)

Ricardo was commissioned by Cheshire East Council to evaluate the options for the development of anaerobic digestion capacity in the council area for food and green wastes. Andrew has undertaken a review of options and developed several hypothetical processing options which he has worked up to describe the inputs and outputs and the size of the plant. He has undertaken studies to examine if the options could fit within the area footprint of possible locations for the facility. This study forms the first phase of Ricardo Energy & Environment's support to the council for the procurement of their AD facility.

2012 - 2013, Expert witness on MBT facility performance (Sheridan Gold LLP and BAM Nuttall)

Andrew was a named Expert Witness on a case of recently constructed MBT facilities where the expected performance has not been achieved particularly with respect to meeting air emission consent limits and required through-put tonnage. The dispute between our client and the facility owners involved several claims and counterclaims. Andrew's involvement included examining the facility design, how it was operated, facility performance and monitoring evidence in order to provide expert opinion on cause of facility under-performance. In this case Andrew participated in meetings with representative experts from facility owners to determine elements of joint agreement and disagreement between the experts involved. The case was resolved by a mutually agreed settlement and subsequently progressed to claims against the suppliers of the MBT equipment; Ricardo supported a successful outcome.

2011 - 2015, Biowaste waste treatment facility procurement (Essex County Council)

As Technical Advisor, Andrew advised the council on the procurement of its biowaste (food and garden waste) treatment facilities which may include AD and/or composting processes. Andrew assessed the waste streams to be treated, prepared outline business case solutions, and assisted with writing procurement documents including specifications for the various stages (PQQ, ISOS and CFT) of the procurement. He was also an integral part of the ECC team evaluating bidder proposals, participating in competitive dialogue with bidders, and supported ECC in final negotiations prior to contract award.

2012 - 2014, Residual waste composition study (Essex County Council)

Andrew managed a project to provide continuous assessment of the composition of the residual waste that will be treated in the Essex Mechanical Biological Treatment (MBT) facility. This included organising the quarterly sampling and analysis of residual waste from several sources including from households, commercial sources, street cleaning and civic amenity site. The data was analysed statistically to determine trends and variability and the associated impact this might have on the MBT performance and to provide comfort to the Authority that the input waste composition would not have significantly changed between the period of awarding contract for the construction and to the operational start-up of the facility.

2008 - 2016, Residual waste treatment facility procurement (Essex County Council)

Ricardo Energy & Environment is acting as consultant to several Local Authorities for the provision of their municipal waste treatment facilities. Andrew, as Technical Advisor to Essex County Council, provided expertise during their recent procurement of a 400,000 tpa Mechanical Biological Treatment (MBT) facility for the treatment of their residual waste. This facility aims to be flexible in either treating the waste for landfill or producing an SRF. Within this role Andrew developed the SRF quality criteria and testing requirements for the council tender specification. Andrew also participated in the competitive dialogue process with bidders which included extensive technical discussion of the SRF output. Andrew was part of the technical evaluation team scoring bidder's submitted solutions during PQQ, ISOS, ISDS and CFT stages ultimately leading to the selection of the Contractor for this procurement. Andrew is currently providing technical support to the council during the commissioning of the facility.

2013, Risk Assessment Organic and Inorganic Waste Land Use (Resource Efficiency Scotland)

Andrew was commissioned by Resource Efficiency Scotland (RES) to undertake a risk assessment for the potential use of an organic and an inorganic waste produced from the waste water treatment plant of a Scottish chemicals manufacturing plant. Both these solid wastes are currently landfilled and the application of these materials as soil improvers to agricultural land or as soil generating materials for land reclamation was seen as a beneficial and economically viable alternative. In this project Andrew undertook a risk assessment of the environmental hazards present including heavy metals, organic pollutants and microbial pathogens present in the wastes. Andrew also reviewed and assessed the regulatory and reputational risks the alternative uses represented. Andrew prepared a peer reviewed report highlighting the key risks to the company and suggesting ideas to mitigate the risk.

2012, Reference site MBT facility evaluation (Hyder Australia)

Andrew has recently carried out a review of two French MBT facilities which had been cited by a bidder for a waste treatment contract as reference facilities as evidence of their proposed Australian MBT facility performance. This entails comparing the proposed facility with the reference facilities and verifying the performance claimed for the reference facilities by the bidders. This included reviewing the air emission control facilities as well as the waste processing equipment performance and quality of the facility outputs such as compost, plastics and metals.

2012 - Present, Revising the Ecolabel for Growing Media and Soil Improvers (EC)

Andrew is currently Technical Director on an EU project to revise the Ecolabel criteria for growing media and soil improvers. This involves consultation with stakeholders, reviewing evidence of environmental and health impacts and preparing revised criteria that will be presented to the EU for acceptance. The proposed revisions have been discussed by the EU member states and undergone consultation with stakeholders. Andrew has revised the proposals in light of the feedback received which will shortly be presented to stakeholders for a second consultation exercise.

2010, Assessment of fate of *Clostridium botulinum* during composting & AD treatment (WRAP)

AEA was commissioned by WRAP to develop a full understanding of whether there are potential additional risks to humans and animals from *Clostridium botulinum* resulting from the agricultural use of composts or anaerobic digestates, when compared with underlying risks from this bacterium. This required an analysis of the potential for *C. botulinum* to be present in feedstocks destined for processing by composting and anaerobic digestion facilities, a review of the bacterium's lifecycle and toxin production, and an analysis of the impact of AD and compost processes on the bacterium and its toxin production. Once the additional potential risk to human and animal health beyond what occurs naturally in the environment was identified a number of risk mitigation and management measures were developed that could be used by PAS110:2010 and PAS100:2005 plant operators, and farmers/growers to minimise any additional risks. AEA undertook a thorough literature review and developed detailed conceptual models to determine the routes from source to receptor. The model was developed with real world data wherever possible and was tested for a range of sensitivities to identify the key model parameters prior to the development of the risk mitigation guidance.

2009, Materials Recovery Facility performance testing (West Sussex County Council)

Andrew participated as part of the AEA team undertaking and reporting the acceptance trial of the commissioning of a new Materials Recovery Facility. This entailed monitoring the trials, evaluating the performance of the facility against contract performance levels and signing off the facility by producing an Acceptance Certificate. Following on, this included monitoring the yield and quality of the recyclables generated from the facility, and the acceptability of these to onward customers, in the year following the completion of the acceptance test.

2009 - 2010, Due Diligence on purchase of IVC (North London Waste Authority - NLWA).

As part of team managed by Ramboll, Andrew undertook a due diligence assessment on the Edmonton IVC composting facility which NLWA were part owners of and wished to purchase outright. This included visiting the site, interviewing operators and managers of the site and inspecting performance records of the site, particularly with respect to compliance with environmental permits and marketing of compost products. The activity also included a technical assessment of the status of the plant infrastructure recommending remedial works with indicative costs for up-grading of the facility performance to current standards.

2009, Agronomic benefits of recycling organic wastes to agricultural land (Department for Environment, Food and Rural Affairs - Defra)

AEA, with WRc, examined the potential composition, agricultural benefits and environmental impacts of the new generation of organic wastes (particularly anaerobic digestates) that might be applied to agricultural land in the near future. Andrew evaluated and reported on the waste compositions in relation to nutrient content, soil quality benefits and dis-benefits, and the environmental emissions to groundwater and air, and to identify any knowledge gaps that Defra need to address.

2009, Bioaerosol Risk Assessment of Proposed IVC and Expert Witness (Confidential client)

AEA undertook a quantitative risk assessment of the risks to sensitive protected habitats from the release of plant pathogen emissions from a proposed in-vessel composting (IVC) facility treating green waste. Andrew evaluated the sources of the green waste and its potential level of infection with plant pathogens, the emissions of plant pathogens during collection, transport and treatment, and the potential impact on the sensitive habitats. This formed part of an environmental statement that Andrew prepared as an Expert Witness in support of the proposed IVC facility and presented and defended under cross examination at a planning enquiry. The public enquiry found in favour of AEA's client.

2002 - 2009, MBT Monitoring Guidance (Environment Agency)

Andrew developed and evaluated waste biodegradability testing protocols to determine biodegradability of MBT outputs to estimate the amount of biodegradable municipal waste that would be landfilled in MBT outputs sent to landfill. The developed tests were evaluated by undertaking studies on several different MBT facilities in the UK. The tests and protocols were incorporated into the Environment Agency guidance for monitoring MBT processes for determining their diversion of BMW from landfill for LATs published in 2005. About 2 years following publication I was involved the revision of the guidance. This included preparing the revised MBT monitoring guidance (published in 2009) following consultation by the Environment Agency which included participating in a consultation workshop and steering committee, and taking into account results of the public consultation on the revised guidance.

2008 Autoclave treatment of municipal mixed waste (Commercial clients)

Whilst at WRc Andrew undertook studies on several autoclave based thermal hydrolysis processes (THP) for the pre-treatment of mixed residual waste. These processes resulted in physical degradation and partial hydrolysis of the biodegradable fraction of the mixed waste into a fibre like material. As part of the studies Andrew assessed the biodegradability of the autoclaved organic fraction by both aerobic composting and anaerobic digestion, and the quality of resulting composts and digestates.

2005 - 2008, MBT facility commissioning and performance monitoring (Shanks/ELWA)

Whilst at WRc Andrew managed programmes to independently monitor the performance of three full scale commercial biodrying MBT plants in the UK during commissioning and acceptance trials including the two facilities at Jenkin's Lane and Frog Island in East London. This involved investigating the quality and purity of MBT output products, such as ferrous and non-ferrous metal and solid recovered fuel, and intermediate process samples against contracted plant performance standards in order to verify the plant performance achieves the contracted requirements. As part of this evaluation Andrew undertook an extensive study in the composition and variability in the quality of the SRF. Andrew gained extensive practical experience in the sampling, preparation and analysis of SRF applying the CEN standards for SRF during this activity. The parameters tested included determination of calorific value, organic carbon, biomass, chlorine, sulphur, nitrogen contents and over 20 other elements including heavy metals.

Career History

2012 - Present, Environmental Consultant, Ricardo-Energy & Environment (Ricardo-AEA)

2008 - 2012, Environmental Consultant, AEA Technology plc

Provision of waste consultancy services within the waste management and resource efficiency team with focus on the microbiological aspects of waste management. Primary roles in residual and organic waste biological treatment infrastructure procurement, due diligence and expert witness advice.

2001 - 2008, Environmental Consultant, WRc

2001, Air Quality Officer, Ellsemere Port and Neston Borough Council

1976 - 2001, Various, Shell Global Solutions

Scientist undertaking microbiological based commercial R&D, and technical service for the Shell Group of companies worldwide in the environmental, oil and chemical business sectors.

Selection of publications

- GODLEY A., Lerpiniere D., Read A. and Smith R. (2013). A Critique of Regulatory Compost and Digestate Quality Limits. Proceedings Sardinia 2013, 14th Int. Waste Man. And Landfill Symp. Cagliari, Italy. 30th Sept - 4th Oct 2013.
- GODLEY A. R. and Read A., 2011, '*How green is Mechanical Biological Treatment. Waste Management World*', Mar-Apr 2011.
- GODLEY A. R. and Read A., 2010, '*Mechanical Biological Treatment - Stabilisation for disposal or production of a fuel stock? Experiences from the UK.*' WASTECON 2010.15th – 17th August, Boston Convention Centre, MA
- GODLEY A. R., Fredrickson J., Turrell J., Smith R. and Blakey N., 2008, '*Characterisation of biodegradable residues from MBT of MSW*'. Proc. Waste 2008, 16-17 Sept, Stratford-upon-Avon, p471-482.
- GODLEY A., Lewin K., Frederickson J., Smith R. and Blakey N, 2007, '*Application of DR4 and BM100 biodegradability tests to treated and untreated organic wastes*'. Proceedings Sardinia 2007. Eleventh Int, Waste Man. and Landfill Sym., Cagliari, Italy 1 – 5 October 2007.
- GODLEY A., Frederickson J., Lewin K., Smith R. and Blakey N, 2007, '*Characterisation of untreated and treated biodegradable wastes*'. Proceedings Sardinia 2007. Eleventh Int, Waste Man. and Landfill Sym., Cagliari, Italy 1 – 5 October 2007.
- Wagland S. T., Smith R., GODLEY A. R., Tyrrel S. F. and Blakey N, 2007, '*Development and application of an enzymatic hydrolysis test to assess the biodegradability of organic waste material*'. Proceedings Sardinia 2007. Eleventh Int, Waste Man. and Landfill Sym., Cagliari, Italy 1 – 5 October 2007.
- Malhotra S. and GODLEY A. R, 2006, '*Application of the Environment Agency MBT monitoring Guidance. Waste 2006*'. Proceedings 4th Int. Waste Man. Conference. Stratford-upon-Avon U.K 19 – 21 September 2006.
- GODLEY A. R., Muller W, Frederickson J., Barker H, 2005, '*Comparison of the SRI and DR4 biodegradation test methods for assessing biodegradability of untreated and MBT treated municipal solid waste.*' Int. Sym. Mechanical-biological treatment of municipal solid waste 23-25 Nov 2005, Hanover, Germany.
- GODLEY A. R., Graham A, Frederickson J., Barker H, 2005, '*Update on Environment Agency evaluation of organic waste biodegradability measurement methods*'. Proc. CIWEM 3rd National Conference, 6-8 Sept. 2005, Wakefield. Paper 50, Vol 2, p37-48. ISBN 1-903958-14-8.
- GODLEY A. R., Graham A, Lewin K, 2004, '*Estimating biodegradable municipal solid waste diversion from landfill: Screening exercise to evaluate the performance of biodegradable waste test methods*'. EA R&D Technical report P1-513. Bullet list of (short) selection of publications

Professional Activities & Membership

- Member BSI AW/20 Committee responsible for maintenance of BSI standards for growing media and related areas