

Professional Qualifications for Air Quality and Greenhouse Gas Management

Prospects and Opportunities

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1 Introduction to the Nature of Training Recognition and Qualifications

1.1 Brief outline of UK Further and Higher Qualification system

Following the end of secondary education at 16 years, students in the UK can enter Further Education which goes beyond the areas achieved in compulsory education, but which is not at degree level (Higher Education). Typically, further education includes A levels, AS levels and vocational qualifications. Higher education covers both conventional honours degrees, post graduate degrees (Master's awards) and doctorates as well as Foundation Degree, a Higher National Certificate (HNC) or Higher National Diploma (HND), or a Diploma of Higher Education.

This outline will deal only with non-compulsory (post-secondary) education.

The system of qualification in the UK for secondary and further education is currently managed by the Qualifications and Curriculum Authority (QCA), set up under the Education Act 1997. The UK Vocational Qualifications system is currently undergoing a restructure led by the Qualifications and Curriculum Development Agency (QCDA). The restructure is establishing the Qualifications and Credit Framework (QCF), which is a new regulated unit-and credit-based framework for recognising and accrediting qualifications in England, Wales and Northern Ireland. The QCF is likely to be fully operational in 2010 with all vocational qualifications available in credit-based units of learning. Higher education awards are managed by the Quality Assurance Agency for Higher Education (QAA) under the Higher Education Qualification Framework¹

1.2 Further Education

Further education contains both conventional A and AS levels or GCEs (General Certificates of Education) as well as a range of vocational qualifications. The conventional GCEs are usually in the standard range of academic topics: Mathematics, English, Physics, Chemistry, etc., as well as a limited number of vocational subjects (known as Applied GCEs). The most relevant of these is the GCE in Applied Science. It is becoming increasingly common for Further Education establishments to offer certain Higher Education awards, for example Weston College in the Southwest now offers a Foundation in Science (FdSc) degree in Environmental Health (accredited through UWE).

1.3 Vocational Qualifications

National Vocational Qualifications (NVQs) are work-related, competence-based qualifications. They reflect the skills and knowledge needed to do a job effectively, and show that a candidate is competent in the area of work the NVQ framework represents.

NVQs are based on national occupational standards. These standards are statements of performance that describe what competent people in a particular occupation are expected to be able to do. They cover all the main aspects of an occupation, including current best practice, the ability to adapt to future requirements and the knowledge and understanding that underpin

¹ <http://www.qaa.ac.uk/academicinfrastructure/fheq/EWNI/default.asp>

competent performance. They consist of a mixture of workplace based assessment and additional classroom training.

1.4 Diplomas

There are currently four types of Diploma (foundation, higher, progression and advanced). These provide a more theoretical and non-workplace based qualification compared to NVQs, but a more practical and vocation based qualification compared to GCSEs and GCEs. Unlike NVQs they are all classroom based.

NVQs and diplomas are generally regarded as an alternative or pre-cursor to degree level qualifications. The target market for an air quality and carbon management qualification primarily identified 2 key primary targets:

- 1: Local Authority Officers (Environmental Health or Environmental Services)
- 2: Environmental Consultants.

It is generally considered that entry to these positions is conditional on having attained a degree, although it may be possible to have become an (non-Environmental Health) officer within an Environmental Services department at a council with only a Higher National Diploma but this is now fairly unlikely.

1.5 Environmental Health Officers

To become an environmental health officer, it is necessary to obtain either an undergraduate (BSc) or post graduate (MSc) degree that has been accredited by the Chartered Institute for Environmental Health (CIEH). In Scotland the degree needs to be accredited by REHIS (the Royal Environmental Health Institute of Scotland). There are currently 15 Universities in the UK that are accredited by the CIEH to run Environmental Health Degrees (see

Table 1 for provision).

Table 1: UK Universities Providing CIEH Endorsed Environmental Health Qualifications

	BSc		MSc		
	Part-Time	Full-Time	Part-Time	Full-Time	Distance-Learning
Coventry University	X	X			
University of the West of England	X	X	X	X	
Leeds Metropolitan University	X	X	X	X	
Liverpool John Moores University	X	X			
Middlesex University	X	X			
University of Salford	X	X			
University of Wolverhampton	X	X			
University of Wales Institute Cardiff		X			
Manchester Metropolitan University		X			
Northumbria University		X			
Nottingham Trent University		X			
University of Ulster		X			

University of Birmingham				X	
University of Derby			X	X	X
Kings College, London			X		

The CIEH identify 5 key areas of Environmental Health work that must be present in an accredited programme:

- Environmental protection
- Food safety and nutrition
- Health and safety
- Housing, and
- Public health

Air pollution comes under environmental protection, alongside water, contaminated land, noise, waste, odour and pest management. Within air pollution, the main focus is on Local Authority Air Pollution Control (LAAPC) and Local Authority Integrated Air Pollution Prevention and Control (LA-IPPC) which regulate Part B and Part A2 processes respectively. As such, Environmental Health degrees contain a relatively small proportion of content relating to air quality management. To address this, CIEH have also developed an additional training package on air quality management/pollution control and contaminated land in AEA Energy and Environment as part of their EMAQ+ package².

1.6 Environmental Services Officer

Many Local Authorities (LAs) no longer have a formal 'Environmental Health' department, instead having a more general Environmental Services department, or similar. This means that in many situations officers carrying out air quality tasks will not have the formal environmental health background, but will have a more general degree in one of a wide range of possible areas including the sciences (including environmental science), geography or public health. Due to the broad nature of these departments, it is possible to enter them with a HND for certain areas of work, particularly technical officers, and with time and increased experience begin to take on more specialist areas such as air quality. As discussed above though, although longer serving officers may not have degrees, it is becoming increasingly rare for new officers to enter without a degree.

Environmental Consultants

Environmental consultancies cover a wide range of disciplines such as assessment of air, land and water contamination, environmental impact assessment, environmental audits, waste management, development of environmental policies and development of environmental management systems. The minimum entry qualification is a relevant degree, and although some of the bigger consultancies operate graduate development programmes, it is common for a Master's degree in a relevant subject to be required.

1.7 Undergraduate Courses

There are over 50 Universities and other institutions (out of 116 Universities and 166 Higher Education Institutions) offering undergraduate degrees in Environmental Science, Environmental

² <http://emaq.aeat.com/>

Protection or Environmental Management. Investigation of a sample of the courses indicated that although air pollution was almost universally covered as a topic, it was rare that 'Air Quality Management' or 'Carbon Management' was an explicit topic. Experience of these courses would suggest that air quality would need to be taken as a speciality module, or a dissertation topic for significant knowledge to be acquired.

1.8 Postgraduate Courses in Environmental Management

A survey of Postgraduate courses (MSc, MPhil, PGDip, PGCert etc) found a very limited range of courses and qualifications with modules relating to air quality management (see list below). The courses tend to cover very broad areas such as "Environmental Management" or "Public Health" as a whole, or to cover atmospheric science with a very heavy emphasis on very large scale phenomena and processes. In some cases 'Environmental Management' is taken in a very narrow business orientated view based on teaching the skills necessary for assessing compliance with environmental standards such as ISO14001.

University of Birmingham - School of Geography, Earth and Environmental Sciences

Air Pollution Management and Control: MSc / PGDip
Atmospheric Sciences and Air Pollution: PhD
Air Pollution: PhD/MPhil

University of Hertfordshire - Science and Technology Research Institute

Atmospheric Dynamics and Air Quality: PhD / MPhil / MRes

London School of Hygiene and Tropical Medicine

Public Health (Environment and Health): MSc

De Montfort University - Faculty of Health and Life Sciences

Environmental Quality Management: MSc / PGDip / PGCert
Environmental Protection: PGDip / PGCert / Professional Diploma

University of Manchester - School of Earth, Atmospheric and Environmental Sciences

Atmospheric Sciences: PhD / MPhil / MSc by research

University of Nottingham - School of Geography

Environmental Management and Policy: PhD / MPhil

University of Southampton - School of Civil Engineering and the Environment

Environmental Pollution Control: MSc

University of Edinburgh – School of Geosciences

Environmental Protection and Management: MSc/PGDip

University of East Anglia – School of Environmental Sciences

Environmental Science: MSc
Atmospheric Science: MSc
Environmental Assessment and Management: MSc

Oxford Brookes – School of Life Sciences

Environmental Assessment and Management: MSc

University of Southampton – Department of Civil and Environmental Engineering

Environmental Management: MSc

University of Sunderland – Faculty of Applied Sciences

Environmental Management: MSc

University of Strathclyde – Centre for Sustainability

Integrated Pollution Prevention and Control: MRes

1.9 Postgraduate Courses in Climate Change and Carbon Management

Although this is a relatively new area a number of new courses are available.

University of East Anglia – School of Environmental Sciences
Climate Change: MSc

University of Edinburgh – School of GeoSciences
Carbon Capture and Storage: MSc

University of Glasgow – Faculty of Arts
Carbon Management: MSc

De Montford University – School of Applied Sciences
Climate Change and Sustainable Development: MSc

Manchester Metropolitan University – Faculty of Science and Engineering
Environmental and Climate Change: MSc

University of Exeter – Department of Geography
Climate Change: MA
Climate Change and Risk Management: MSc

University of Leeds – School of Earth and Environment
Sustainability (Climate Change)

1.10 Continuous Professional Development

Continuing Professional Development (CPD) is something that should ideally be undertaken by anybody in employment. In particular though, it is a means by which professional bodies such as the CIEH and Institute of Air Quality Management (IAQM) can ensure the continuing competency of their members. The IAQM states that the aim of CPD is to “develop and maintain standards of professional competence and knowledge through a combination of training, learning and practical experience.”

Members of these bodies (with some exceptions³) have to undertake a certain amount of CPD activity every year. CPD activity can include special courses and training events, particularly on new legislation or guidance. Participation in Special Interest Groups, regional meetings or in conferences also attracts CPD points. The CIEH also set CPD ‘assignments’ in the monthly journal *Environmental Health Practitioner* in order to provide opportunities for members not able to participate in the more conventional CPD methods.

Aside from the requirements of professional bodies, there is significant interest in employees undertaking CPD activities from both employees themselves and their employers. Individuals generally wish to feel that they are not standing still in their work, and CPD activities allow them to both feel that they are developing and progressing their career, and allow them to put their role in a wider context. Employers want to ensure that their staff are completely up-to-date with the latest policy and science, particularly in the case of air quality management and climate change, which has been a very rapidly developing area over the last 10 years. CPD can be a way of providing new core skills to employers without having to bring new people into the workforce.

1.11 Short-courses and Other Training Provision

A number of institutions were identified who ran specialist short-courses on particular technical or policy aspects of air pollution. These tended to be much more focused on the professional requirements of local authority officers and consultants working directly in the field of air pollution/air quality management, or in related disciplines.

- Air Pollution (5 day course) - Newcastle University
- Air Pollution Modelling – Wessex Institute

³ e.g. student, associate and retired members

- Air Pollution and Monitoring Methods (5 day course) – Cranfield University
- Local Air Quality Management for Planners – UWE, Bristol
- LAQM for Transport Professionals – UWE, Bristol
- Air Quality Assessment for developers– UWE, Bristol
- Principles of Review and Assessment – UWE, Bristol
- Consulting the public and other stakeholders in LAQM – UWE, Bristol
- Stack Emissions Monitoring, AQ Monitoring, Software - Enviro-technology
- EMAQ courses – AEA Energy and Environment

2 Current and Future Demand for Training and Qualifications

2.1 The requirements of the LAQM process

AQMRC's experience in the management and implementation of the UK Local Air Quality Management (LAQM) process since 1998 has provided a strong anecdotal and empirical need and desire for training of air quality officers in LAs. Whilst many LAs employ consultants to undertake the basic LAQM Review and Assessment tasks of writing Updating and Screening Assessments and Progress Reports, the system has been designed so that it should be possible for non-specialist officers with only a very basic understanding of the relevant issues to undertake this. In most cases the provision of the necessary information to a consultant is the greatest part of the work, and the consultant's task becomes little more than the formatting of the information and structuring of a report – a task that has become even simpler following the introduction of a standard report template for Updating and Screening Assessments (with one to follow for Progress Reports by April 2010). In the experience of many of the appraisal team, Review and Assessment reports that have been authored by LAs are often of a better quality than consultant authored reports, due in part to the inherently greater degree of local knowledge employed.

Once an AQMA has been declared (as is the case in over 50% of LAs in the UK) it becomes significantly more important for LAs to have expertise in air quality issues as the action planning process, in order to work effectively, needs to be fully integrated into the authority's operation. This is therefore difficult with consultants, due to the need for continual input, rather than the production of a one-off report.

Over the 10 years of the LAQM process there have been three major updates to the guidance, along with a continual increase in experience, knowledge and understanding of the processes involved (both in terms of changes in the nature of the pollution problems we face (e.g. NO_x: NO₂ issues), or in the way we measure the pollution (e.g. diffusion tube bias adjustment or model verification and adjustment procedures).

2.2 Local Authority Air Pollution Control

Within LAs, there are additional air quality tasks outside of the LAQM process. One of the key ones here is the management of Part A2 and Part B registered processes. Whilst these tasks are relatively simple, and covered in most Environmental Health qualifications, there is an increasing need for a wider understanding of some of the basic air pollution issues, especially in the area of the regulation of biomass combustion plant. The recent drive towards the expansion of biomass combustion has led to a new air pollution issue that is not covered adequately by traditional experience (in particular the Clean Air Acts were not designed to cover biomass plant, and tools such as 'D1' are unable to perform the necessary calculations for stack heights). Previous changes to the LAAPC role have included the changes related to the move from IPC to IPPC following the European Directive, and the consequent introduction of A2 processes to the LAs' registers under LA-IPPC.

2.3 Requirements for Personal Development

Aside from the need to have the skills to be able to carry out their jobs adequately, as discussed in the previous section, local authority officers have a need to carry out training for their own personal development, both in order to provide them with a feeling of progression, and to fulfil requirements of their employers and/or professional bodies

2.4 Change of Staff

Whilst many air quality officers are trained environmental health officers and should therefore have some basic training in air quality management (or more likely air pollution control), many LAs have environmental services departments, or similar, where officers may not be from the

traditional environmental health background. In these cases it may be common for training in air quality management to be necessary to understand the context of the work to be done.

2.5 Training Requirements for Consultancy

The main routes into environmental consultancy tend to be through the attainment of a Bachelor's degree in environmental science, or at a higher level, through a Master's degree in a subject such as Environmental Impact Assessment. Through either qualification air pollution will form a minor part of the entire curriculum. Where policy rather than science is covered, this is likely to be very limited and not provide an understanding of practice. Within consultancies, there is a strong opportunity to learn 'on-the-job', however this rarely allows an overview of the issues to be provided. Within consultancies, people who have non-environmental backgrounds (such as transport and engineering) may end up carrying out projects related to air pollution, or overseeing teams carrying out air pollution work.

2.6 LAQM Training 'On-The-Job'

As noted above, many LAs commission consultants to carry out parts of their LAQM work for them. AQMRC have a history of carrying out work in this capacity. However, as part of our commitment to capacity building within LAs, in the run up to the commencement of Round 4 (USA reports due April 2009), AQMRC trialled a new training opportunity as an alternative to being commissioned as a consultant to write the USA reports. This consisted of providing a day of one-to-one training for LA officers to guide them through the process of writing a Review and Assessment report using their own datasets, followed by additional support if required in completing the report. All reports completed in this way have been accepted through the appraisal process and the LAs have all committed to writing their own Progress Reports next year.

2.7 Training in Carbon Management

Carbon or greenhouse gas management covers a much wider range of issues and disciplines than LAQM. There are key areas which have significant overlaps with LAQM though, both sharing the management of the same sources and some of the central principles of atmospheric emissions management. Training in this area can focus on two key issues, firstly broadening the experience and understanding of air quality officers in order to help them take on carbon management roles, or secondly providing training for a wide range of people to take on carbon management roles in organisations. This paper focuses principally on the former, looking at training provision that would be based on emphasising the application of AQM skills to carbon/GHG management.

2.8 Historic Trends in Environmental Education

The 1990s saw a huge increase in the provision and uptake of both undergraduate and postgraduate environmental qualifications in the UK. This was driven partly by the introduction of various pieces of legislation such as the Environmental Protection Act 1990 and the Environment Act 1995 which led to a skills shortage in the environment sector. It was also fuelled by both the social prominence of environmental issues (such as road building and tropical hardwoods).

By the end of the 1990s supply had overtaken demand and there was a widespread rationalisation of courses due to falling intakes. This, combined with the tendency for the universities' Research Assessment Exercise to focus on certain core areas of research and teaching has led to the limited number of universities identified above as being the main recognised bodies in this field. It is notable though that each course is likely to be influenced by the department in which it sits giving a particular flavour to much of the teaching. For example a course in Environmental Management may focus on different areas when located in a Department of Engineering compared to a School of Environmental Science.

In terms of future demand for courses, the recent high profile of climate change looks like it is leading to a similar growth in postgraduate courses related to climate change and carbon/energy management. It should be noted though that as climate change and sustainability are such cross-cutting themes that the potential for different 'flavours' of courses is much greater, to the extent that many universities are now considering the introduction of compulsory modules on climate change/sustainability within all of their courses.

3 UWE HERDA Project in the Education/Training Context

Following this assessment of the current availability training and related qualifications focussing on air quality management, and related aspects of climate change, UWE highlighted a gap in comprehensive, structured, and accredited training. Consequently UWE submitted a bid to the Higher Education Regional Development Association (HERDA) as part of the Higher Level Skills Pathfinder Project in the South West Development Fund to develop a flexible training package at Masters level to meet the needs of air quality professionals.

The target market identified was two-fold, covering the needs of both :LAs and environmental consultancies it was recognised that training needed to cover both existing professionals needing to update their knowledge as well as providing a foundation for those seeking to enter the profession with an honours degree or similar qualification. From research undertaken by AQMRC, it was clear that the required formats for training were extremely varied, and therefore any training package needed to be extremely flexible.

Whilst the main target is air quality professionals who generally have a degree in environmental related field in order to enter the profession. The training materials will be designed for new employees who have recently entered or wish to enter the profession and existing employees who need to be informed and updated of the developments in air quality and carbon management. In addition to this, further consultation with the project’s advisory group during the development of the training materials has identified the potential use of introductory level modules to be provided for professionals in related disciplines in LAs (such as transport and land-use planners) to help facilitate inter-departmental working. There has also been an interest expressed in providing training opportunities for elected members.

3.1 The nature of the proposed training materials

The training materials have been developed around a specific delivery model that will maximise the flexibility and accessibility of the training. The materials will be delivered through an innovative blended learning approach involving online learning and short course provision offering both CPD certificate for professional body purposes and credits to be accumulated towards a UWE higher degree qualification. The figure below illustrates the proposed pathways of learning.

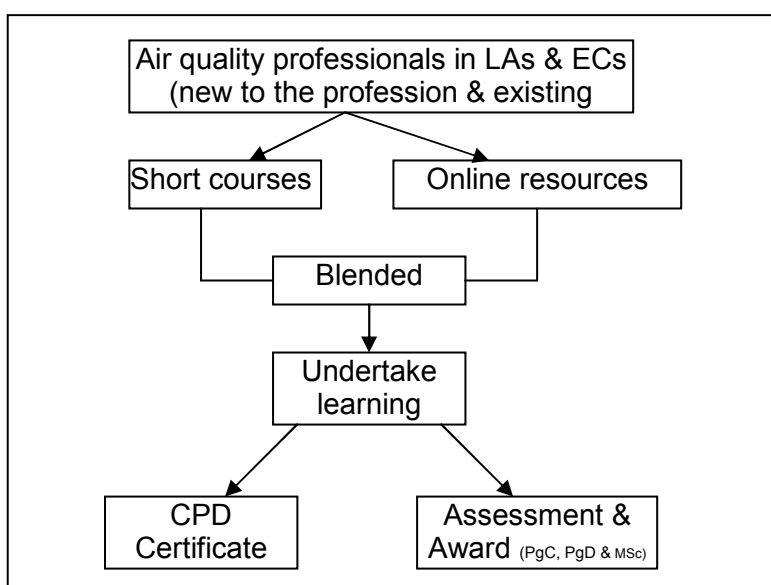


Figure 1: Blended Training for CPD or Qualification

Learning – learning modes are available in three categories of challenge to cater for both identified markets. Access to learning materials will be via attendance at short courses or via access to online resources. A CPD outcome is available for those who do not wish to undertake formal assessments.

Assessment – for those seeking credit for one of the three awards, assessment will need to be passed in accordance with university regulations. A variety of assessment types will be used as appropriate to the context of the learning. Some examples include multiple choice, short answers, conventional essays, reflective log and viva.

The proposal builds upon the needs identified by a selected number of LAs and ECs as they have expressed difficulties in acquiring the knowledge needed to operate in an appropriate format. These employers have expressed the need for training on air quality and carbon management to enhance their personal developments and to provide assistance in delivering their duties.

Neither format need be exclusive, and the UWE HERDA material is intended to be targeted towards a 'blended' learning environment where modules can be delivered directly by experienced tutors/trainers who are able to enliven the subject, but embedding a wide range of on-line learning resources within the module packages. Although this blended mode is the ideal, modules are designed to be comprehensive and self-contained and will therefore be deployable entirely on-line.

3.2 Support for the UWE training method

Research carried out to support the initial funding application surveyed a number of LAs and environmental consultancies in order to assess their demands and the likely suitability of the proposed model.

The following benefits have been identified following discussion with key representatives of employers in the LA and environmental consultancy sector. The business benefits are illustrated by specific comments from LA and environmental consultancy representatives.

3.2.1 Local Authorities

Efficiency – “The curriculum has been designed with different levels of audience in mind. Other Council officers who are working in planning and transport departments will be able to understand the type of information required by the Air Quality Team and the reasons behind the information request.”

Cost-effectiveness – “Students can pick and choose the most appropriate modules and undertake learning at the most convenient time for them. The blended approach offered will reduce the time and cost of sending Council officers on a training course.”

Customer Service – “Overall, the Council will be able to offer a more coherent and efficient service to the public. Officers working in the Air Quality Team will have increased and updated knowledge and partner teams (planning and transport) will have a better understanding of our actions.”

Employee Development – “The Council have put procedures in place to support CPD activities. Relevant Professional Bodies i.e. the Institution of Environmental Sciences (IES), the IAQM, and the CIEH require their members to have a portfolio of CPD which is audited by the Professional Bodies. Officers at the Air Quality Team are members of the IES and the IAQM whilst other officers within the Environmental Health Department may be members of the CIEH.”

National Agenda – “LAs are coming under increased pressure from the Central Government to deliver better environmental practices. [This] Council aims to be proactive in leading the implementation of this agenda. It is most appropriate for Elected Members to undertake the Introductory Modules listed in this proposal in order to make better and informed policy making decisions.”

3.2.2 Environmental Consultancies

Efficiency – “The proposed training programme allows individuals to fill gaps in the knowledge of air quality and climate change. Junior members of staff can undertake the programme independently and immediately apply the practical knowledge acquired to do their jobs more effectively. Senior staff will spend a great deal of time mentoring junior staff without practical skills to ensure that work is carried out properly. Therefore the senior staff has less time working on their own projects, which means reduced efficiency.”

Cost-effectiveness – “The blended learning approach fits well with the private sector as it is a cost-effective way to increase company’s efficiency. A smaller profit margin is usually experienced when environmental consultancies taking on recently qualified graduates because senior staff has to spend time with new members of staff rather than dealing with clients and bidding for new projects.”

Customer Service – “The proposed training programme will enhance our efficiency and quality of work which consequently will deliver the highest customer service quality to our clients.”

Employee Development & Retention – “There is a relatively high staff turnover within this industry; a number of consultancies reported a turnover rate as high as 30% last year. There is generally a shortage of skilled personnel. This training programme offers an opportunity to create a bigger pool of skilled individuals and most importantly will also help address the retention issue faced by the industry.”

Loss of revenue – “Our business is built on the relationship between individual consultants and their portfolio of clients and therefore it is likely that when a consultant changes job, clients will follow the individual consultant. As a consequence, the company will have to spend time and money in developing new relationships with new clients. Therefore, it is essential that environmental consultancies are able to offer a flexible framework to encourage staff development which will encourage staff to stay with the organisation.”

4 Mechanisms for Delivering, Assessing and Funding Training

Within the preliminary work that AQMRC carried out prior to the development of the HERDA project, the two key issues that need to be addressed to ensure a flexible training/education package were Learning and Assessment:

Learning - The need for both distance learning and face-to-face sessions;

Assessment -The ability to take either individual discrete modules as CPD, or an entire course as a Master's or Diploma qualification.

4.1 Mechanisms for Delivering the Training

The training and teaching required for both CPD provision and academic qualifications can be delivered in a number of ways. One of the key differences in delivery is whether the course is designed as distance learning or whether it is intended to be provided directly within a classroom environment. Delivery with regard to distance or remote learning may initially appear to require a much more comprehensive and precise set of training materials that package both general content and references to relevant material to allow the student to be able to identify and access a wide-range of supporting material, and to some extent to pre-empt with supplied information any questions that might arise which, in a contact teaching environment, would be directed at the trainer/lecturer. However, in order to try and ensure some degree of parity between remote and face-to-face training with regard to the knowledge base, access to full remote training modules might be provided to those people electing to take the classroom option.

This issue begins to highlight the need to distinguish between what are the teaching/learning requirements for CPD and for formal postgraduate qualifications when the subject matter being taught is essentially the same.

4.2 Mechanisms for Delivering the Assessment Processes

CPD is largely assessed on a 'time-spent' basis. This may be through the certified attendance of training workshops or conferences, or through self-certification for more informal activities such as "□Reading relevant journals/magazines or Networking" (examples from IAQM CPD Guide). For postgraduate qualifications, assessment is necessary, whether through the submission of coursework or through exams.

CPD training would not require any submission of work to ensure the completion of training. For remote learning modules, self assessment questions might be set to help ensure that the trainee was confident in their learning process. Where the CPD modules are being taken as part of a workplace sponsored scheme it may be the case that a line manager may wish to check learners' responses to these self assessment questions prior to signing off the module. Where CPD modules are self-funded, it is presumed that the content will have been completed and read adequately in order to achieve due value from the purchase of the module. A standard number of hours would be attributed to the CPD courses (potentially a full day), based on the time taken for working through the module and a cursory investigation of related material.

Postgraduate qualifications are based around the attainment of credits for taking individual modules. For a Master's degree it is necessary to achieve 180 credits, for a Postgraduate Diploma, 120 credits. A conventional taught Master's module may vary in size between 10 and 60 credits where 1 credit equates to a notional 10 hours of student effort. The module may be delivered in one term (or semester) or extend over the full academic year. The modules designed for the HERDA course are each worth 5 credits and each is expected to require 50 hours of structured work. Structured work does not necessarily involve teaching, and in practice will mainly involve directed reading and preparation for and undertaking formative and summative assessment. On this basis it will be feasible to use the same materials as for CPD training as the

basis of the course, but, through the requirement for formal assessments to achieve the credits, it will be possible to ensure that the investigation of additional material is taken much further.

The modules being prepared by UWE will need to be approved by the University's procedures for module approval. For the award of an MSc the package of modules, the delivery approaches and the proposed approach to the support and guidance of students will need to be validated according to the University's programme approval and validation requirements... The intentions expressed above may be mediated by the approval processes for module and programme validation.

4.3 Funding for Training

Within the LAQM process, Defra and/or the Devolved administrations have commissioned the helpdesk teams to undertake training courses open to local authority air quality officers for free. For the last round of guidance in 2009, although Defra funding did not allow for this they endorsed a series of workshops in England that were carried out by the Review and Assessment helpdesk team on a commercial basis, and LAs had to pay for places at the workshops. The Devolved Administrations, on the other hand, contracted the Helpdesk team to run workshops to which LAs could send staff free of charge.

With regard to CPD or formal qualifications, the provision of funding for any training will always be primarily down to the trainee or their organisation to organise. It may be that it would be possible for funding to be provided indirectly such as through a Job Centre (UWE is currently in discussion regarding an opportunity here), or other independent career development mechanism. The availability of grants to undertake training is likely to depend to some extent on mode of provision and degree of assessment.

Whilst undertaking the academic qualification will require a full course fee prior to commencing the teaching, the CPD training route could be done in two ways. The trainee (or their organisation) could purchase and undertake the course on a module-by-module basis, paying only for those modules they want to take as required. Alternatively, access to the courses could be bought as a 'job lot' by trainee to be taken at their leisure, or by their organisation, possibly with rights for a number of employees to access each module and a time limitation for access to the online modules (as used in ESRI's Virtual Campus GIS training environment).

5 Relationships between Training Providers

As described above, there are very few providers of academic qualifications for air quality management related subjects. Choices regarding the institution at which to learn will be strongly affected by the co-specialisms of the university or institution, and by its location (or whether or not it provides a distance learning option).

Within the CPD arena there are a number of different companies and organisations competing for business; however, these are again very limited. As with the formal qualifications at different universities, the provision of training by organisations is likely to be very distinctive to the training provider. With face-to-face training, even if the training materials and structure is the same the training experience can be very different depending on the individual trainer or trainers, let alone between organisations.

5.1 Collaborative Models

Ideally, there should be the potential for collaboration between training providers to provide a cohesive national training programme on air quality. This would traditionally have been difficult, particularly with regard to the establishment of formal qualifications rather than CPD training (as the ability to award degrees is conferred on individual institutions).

Where a full training programme would be comprised of modules developed by a range of organisations, there may be problems regarding the cohesiveness of a course due to the increased difficulty of ensuring that all modules dove-tail well. In some cases, however, it could be reasonably easy to divide tasks in areas of air quality and carbon management between collaborators, particularly, for example, where one partner may be more experienced in technical aspects (monitoring etc.) and other more policy and theory issues. Working collaboratively does raise some issues regarding control over teaching materials, and over differences between the division of labour involved in producing and delivering courses. If the collaborative working was intended to contribute to the award of credit for the purposes of accumulating sufficient credit for a qualification then the issue of credit recognition between providers will need to be addressed.

Another potential model for collaborative production of training materials would be for an institution/organisation to take on the management of a CPD course compiled from modules by different training providers (either other academic institutions or private sector organisations (or even some developed in-house). This would potentially preclude, or at least complicate the co-ordination of face-to-face training. There may also be significant problems to be faced as well in terms of commissioning training materials for this model. However, another parallel initiative within HERDA-SW is the development of a “Shell Award Framework”⁴ whereby it will be possible to undertake modules at a range of institutions in the southwest in order to build towards a full qualification validated by the University of the West of England.

5.2 Competitive Models

Within a competitive model of training provision, the endorsement of qualifications and modules by external professional bodies might become problematic. Endorsing bodies will need to consistently judge the balance between different courses that they endorse in order to ensure continuing quality. Once badged, issues might arise through reduction in the quality of training in favour of competitive lower costs. At the moment, aside from the CIEH accreditation of certain Environmental Health degrees, most endorsed training occurs on a one off event basis or multiple events in different locations. The endorsement by a particular professional body of a course or

⁴ <http://www.herda-sw.ac.uk/currentprojects/HigherSkills/ShellFramework.aspx>

qualification in air quality and carbon management would need to be subject to the rules and regulations of that professional body and will undoubtedly incorporate the requirement for annual reporting and periodic inspection of the provision. In this way the potential risk to the academic quality and standards of the provision will be managed.

5.3 Issues Regarding the Intellectual Property of Training Materials

The creation of comprehensive types of training materials necessary for the provision of remote learning courses is highly labour intensive. Whilst materials for face-to-face training can be limited to some slides with bullet points, in order for a remote or distance learning module to work there needs to be a complex interrelation between the general framework of the module and external learning resources. If external bodies were employed to develop modules for an umbrella organisation, there would be some significant issues to resolve regarding the ownership, recognition and reward arrangements regarding the embedded intellectual property (IP).

IP for the creation of training materials is likely to rest with 'creator' of work (or with their employer) unless they have been specifically contracted to provide the training organisation with materials AND have arranged to hand over the IP rights. In many cases this is an unlikely scenario, as the development of the training materials for a specific course will, most likely, be based on a long history of existing material.

As an alternative model, the development of training materials could be commissioned from a range of organisations by the umbrella body, and although IP would rest with the creators, the materials could be licensed out to organisation carrying out delivery.

With the handing over of rights to the training materials (either in *toto* or by licence), it would still be necessary to give recognition to the creators of the work. In fact some of the credibility of the composite course might arise from the fact that the modules were created by particular people of organisations.

This model of an independent organisation managing a course comprised of individual modules created by a number of different parties may be one way forward towards a standard national training programme. However, it would have to be limited to providing training on a CPD basis unless it tied itself to a specific academic institution in order to provide officially recognised qualifications. Whether or not it did this, the independent organisation would also find itself in competition with other organisations in the provision of training, including those that were responsible for the provision of some of its course materials. Whilst in an ideal world this would not be the case, under the current and foreseen economic climate many organisations, particularly universities, will have to strengthen their income streams in any way possible. This is potentially likely to lead to increased competition within the training market.

The reverse of this training model would be to leave the provision of training in the hands of those organisations currently carrying out and developing training courses (either as CPD or formal qualifications). As with the current endorsement of training seminars for CPD purposes, professional bodies would be able to simply endorse courses or other training provision. It may also be possible for the professional bodies to participate in the development of the courses, either simply through liaising on the content (in order to ensure that content was adequate and suitable to justify their endorsement), or potentially through the commissioning of a bespoke module where an identified gap requires closure. The IP issues in this example would need particular clarification.

6 Conclusions

There does certainly appear to be a 'gap in the market' with regard to the provision of *formal and cohesive programmes of training* for in the area of air quality and greenhouse gas management. The emphasis here is very much on the issue of 'formal and cohesive programmes', as there is a range of organisations who currently carry out regular training events on a periodic or ad-hoc basis on a range of air quality related matters. The training provided by these organisations is generally recognised as being suitable for recording as CPD experience, and in many cases is given an official badge by organisations such as CIEH, IES or IAQM.

The development of a comprehensive training programme requires a significant degree of effort, particularly when it needs to be able to be deployed as a stand alone distance learning module, or to exist within a self-contained virtual learning environment. The experience of the AQMRC in developing these materials, along with the research that we have carried out, strongly suggests that the key to a successful training programme will be flexibility. This flexibility will need to be inherent in the versatility of training modules within both a CPD environment and as a means to gaining a formal qualification. It will also need to be present in the nature of the modules themselves – with modules constituting very small 'bite-size' units that can be specifically targeted at different levels of skill and experience.