

UK CONTROLLED ENVIRONMENT USERS' GROUP

MINUTES OF 2009 ANNUAL GENERAL MEETING

The Annual General Meeting of the Controlled Environment Users' Group was held on Tuesday 15th September 2009 at Holiday Inn, South Luton.

The UK CEUG Secretary, J Franklin, opened the meeting at 21.15 hrs.

Present: D Adair, D Alger, S Andrews, B Ashton, L Benjamin, D Clark, A Cookson, R Darby, C Denston, C Fox, J Franklin (Secretary), C Fryars, E Fryars, M Fuller, P Gill (Treasurer), M Gimenez, P Glanfield, G Holmes-Henderson, P Langley, K Manger, A Morgan, A Munro, R Natt, L Incoll (Chairman), A Padfield, I Pearman, L Penketh, L Perkins, P Reed, M Richardson, B Robertson, K Sawford, A Sim, D Skelton, M Stenning, G Taylor, C Tilley, G Waimann, D Wildman.

Apologies: M Hibbert, G Holroyd, I De Jaeger, C Natt, S Robertson, K Staples.

1. Minutes of the previous meeting at West Park Centre, University of Dundee, on 8th September 2008.

The minutes had been distributed to members before Christmas in the annual mailing and were available on the CEUG web site. There was one correction from G Pitkin "... the Light Sensor Calibration Kit is almost ready to go in September 2009 ..." should have read "in September 2008". The minutes were approved unanimously as a true record of the proceedings (proposed: G Holmes-Henderson; Syngenta; seconded: B Robertson, JIC).

2. Matters Arising

There were no matters arising on the minutes.

3. Chairman's Report (L Incoll, University of Leeds)

"This year of activity began in the middle of our workshop at Dundee last September and it ends in the middle of our annual scientific meeting hosted by Rothamsted Research. Significant progress with the organisation of the 2010 meeting in Sussex and the 2011 meeting at York promise two stimulating meetings. I am pleased to report that I have finally completed the transcription of the duplicated paper records of the group going back to its foundation in 1966 to a digital archive and its transfer to our web site. I am pleased to report that recruitment of new members has been higher than usual for the second year in succession. Fuller reports of these highlights follow.

The educational objectives of the group have been met in several areas this year. First all members have received a personal copy of the "Guidelines for Measuring and Reporting Environmental Parameters for Experiments in Plant Tissue Culture Facilities". As well, members from departments, institutions and organisations with controlled environment facilities have received a copy of the A3 poster of the guidelines for display in their facilities. Secondly, we held a very successful second workshop. Thirdly our on-line interactive discussion group has continued to host

constructive discussions on controlled environment subjects. Lastly we have completed a full year of availability of the Light Sensor Calibration Package though its take up has been very disappointing.

Recent Meetings

1. Dundee 2008 – Workshop on “Water and its measurement in CEs”

Our second workshop was adjudged very successful by delegates and Executive Committee alike. There were 77 people involved – 48 delegates, of whom 39 were members, seven lecturers whose lectures set the scene including one from the US and one from France, 13 demonstrators (representing eight manufacturers), many of whom who provided stimulating hands-on practical demonstrations of their equipment in SCRI’s CE facilities, and nine SCRI staff who provided support. The workshop was a challenge for many of us, catching up with the latest concepts, techniques and equipment for measuring atmospheric water and soil water in CEs, but well worth the effort. The workshop was enlivened by the conference dinner at Discovery Point, Discovery Quay, Dundee. Following a welcome from the Lord Provost of Dundee and response by me, we had a guided tour over Scott’s polar ship, the RRS Discovery, after which we were piped into the dinner and ‘released’ to enjoy good food and wine by me presenting the piper with the piper’s customary quaiich of whisky.

The Executive Committee would appreciate your feedback on workshops. This, our second, required a considerable effort and time from the local team. Are they worth it and if yes, what further workshop would you like? Without the support of SCRI’s director, Peter Gregory, it would not have been possible. We are therefore most grateful to him and to Peter Gill and Graham Pitkin and their supporting team.

2. Hertfordshire 2009 – South Luton and Harpenden “CEs for Containment”

This meeting will be half way through when this report is presented at the AGM. At the time of writing, it is evident that the efforts of the local organising committee, Laurence Benjamin, George Waimann, Ian Pearman and Jean McCarthy led by Julian Franklin, in organising an excellent set of scientific papers, comprehensive tours at Rothamsted and an interesting trade exhibition have been rewarded by what must be one of the highest attendances if not the highest attendance at one of our 24-hour annual meeting.

Future Meetings

2010: Martyn Stenning and Keith Manger have the organisation of next year’s annual meeting on the subject of "CEs for conservation: from genotype to ecosystem" well in hand. Five speakers have agreed to participate in the afternoon scientific sessions at the University of Sussex, three of these speakers are from outside the UK, viz. Montpellier, France, Wageningen, The Netherlands and Svalbard, Norway. The following morning’s tour of facilities and trade exhibition will be at the Millennium Seed Bank Project at Wakehurst Place.

2011: Colin Abbott (University of York) and Richard Natt (FERA, Sand Hutton) have started to organise the 2011 annual meeting at York on the subject of “Greenhouse technology and practice”. The afternoon scientific sessions will be at FERA (ex-CSL)

at Sand Hutton and the tour of facilities will be at the Department of Biology, University of York, with the trade exhibition, and at Stockbridge Technology Centre, Cawood.

2012: I regret that organisation of the fourth international CE conference at Cambridge in September 2012 has made no progress since June last year. It is worrying to have lost one of the four years available for its preparation.

Communications

1. 'UK-CEUG' JISCmail List

There has been more activity in the last year with a smaller number of informative messages from the Executive Committee (12) but with more messages from members (49) seeking help by asking questions and participating in the sometimes considerable discussion. Thirteen subjects were discussed ranging from 'swap of tubes' to 'control of mildew on protected barley'. In the following list, questions are indicated by '?':

1. F Gas regulations update - George Waimann (1)
2. Guide to Containment - Lynton Incoll (1)
3. Announcement of despatch of annual mailing - Lynton Incoll (1)
4. Xmas message - Lynton Incoll (1)
5. News about LI-6400 training course – Peter Gill (1)
6. LSCP – Lynton Incoll (1)
7. Attachments to messages – Lynton Incoll (1)
8. Request for greenhouse guidelines volunteers - Lynton Incoll (1 + 4 responses)
9. Last notice for bookings – Julian Franklin (1+1)
10. Agenda for AGM – Julian Franklin (1)
11. Chairman's Annual Report 2009 – Lynton Incoll (1 + 1)
12. Artificial Optical Radiation Regulations – Matthew Penrose (1 + 1)
13. Your passwords – Lynton Incoll (1)
14. ? IR camera – Hazel Smith (1)
15. ? Swap of tubes on offer – Martin Lappage (1)
16. ? Nomad loggers - Lance Penketh (1)
17. ? Glasshouse fumigant - Lance Penketh (1 + 2)
18. ? Saewater greenhouses - Lance Penketh (1 + 3)
19. ? IP rating - Sophie Haupt (1 + 2)
20. ? BMS - Guy Holmes-Henderson (1 + 7)
21. ? Sterilizing pots – Peter Gill (1 + 7)
22. ? Arabidopsis seed store – Lance Penketh (1 + 1)
23. ? Hydroponics kit – Lance Penketh (1)
24. ? Arabidopsis plant growth chambers – Sophie Haupt (1 + 5)
25. ? Control of mildew – Karen Staples (1 + 10)
26. ? Soya beans – Peter Glanfield (1 + 3)

2. Website

The following existing pages have been modified and one new page (Item 19) has been added to the home page:

1. Item 2: 2009 Rothamsted meeting announcement was added on 7/10/08 <announc09-ceug.htm> and updated in May 2009 with the booking form included
2. Item 8: 2008 Proceedings added on 8/12/08 <Proceedings-08-acro-1.pdf>.

3. Item 7: 2008 AGM minutes added on 5/1/09 <Minutes-08-acro.pdf>.
4. Item 8: 1999 Contents page <contents-page-99.htm> and proceedings <Proceedings99.pdf> both added on 13/1/09.
5. Item 8: 2008 Contents page for Proceedings was added in early 2009 <contents-page-08.htm>
6. Item 2: 2009 Rothamsted meeting announcement was updated in May 2009 with the booking form included.
7. Items 3 & 4: Manufacturers pages were revised on request.
8. Item 16: ICCEG minutes from Cocoa Beach 2008 were added in May 2009 as a clickable link to document <ICCEG-2008-minutes-1.doc>
9. Item 19: This new item was added in early April 2009 – History and Records of the Group; with scanned documents in PDF from 1966 to 1992 and subsequently brought up to date to 2008.
10. Item 2: 2010 Sussex meeting announcement added on 20/07/09 <announc10-ceug.htm>.
11. Item 9: The ‘Proceedings of Scientific Meetings’ from 1990 to 1999 have been archived with their contents pages via a new link to a table containing all contents pages and full proceedings.

The new page (Item 19) makes available to the group and to the wider scientific community of the UK, the records of the meetings of the group since 1966 to the present. The scientific proceedings of the group since 1990 are also made available in Item 9 of the home page. Many of these records were previously only available in decaying and sometimes almost illegible duplicated copies. I scanned them using optical character recognition, transcribed them to digital documents, converted them to PDF files and mounted them on our web site. They are 'warts and all' copies, in effect facsimiles with spelling and grammatical errors preserved.

Comments on the web site – its items, its ease of use and suggestions for new pages, are welcome.

Membership

For a second year there has been a greater net increase in membership which again conceals a very good number of new members offset by a more resignations, deletions and retirements than last year. Sadly one member, Phil Iveson of Conviron, died in May. We have four new overseas members. The new members from Ireland and Belgium resulted from contacts at the Florida International meeting. The new French member replaces Jacques Boccon-Gibod at INH, Angers. Since September 2000, total membership has increased by 50.

Since September 2008

Category	Number
New members	20
Members resigned or removed	9
Net change	+11
Current total	188
No E-mail contact – <uk-ceug> JISCmail group (no e-mail address or unsubscribed)	5
Attended the 2008 workshop (members only)	39
<i>Overseas recruitment:</i>	
Australia - joined	
Belgium - joined	1
Canada – joined	
Germany – joined	
France – joined	1
Ireland - joined	2
The Netherlands – joined	
Spain – joined	
USA - joined	1

Publications

1. Recruitment poster

The full-sized recruitment poster for display at scientific meetings other than our own has been completed with the help of Graham Pitkin and the SCRI ‘visual aids department. We are now looking for members to help us to publicise the group by taking the poster to scientific meetings and passing on membership leaflets to interested colleagues.

2. CE Guidelines for tissue culture facilities

Paul Austin, New Zealand member of the ACEWG, had not been able to organise the printing and despatch of the remaining leaflets and small posters of these guidelines so I had to take over the task for the International Committee on CE Guidelines’ (ICCEG’s) sub-committee on Tissue Culture Guidelines. The printing was completed in Yorkshire and copies distributed to the three CE organisations, ourselves, NCERA-101 and the ACEWG. Our secretary has distributed copies of the leaflets to all members and of small posters to members with CE facilities.

3. CE Guidelines for monitoring and reporting environmental parameters of experiments in greenhouses

A proposal from one of our Canadian members and member of NCERA-101, Mark Romer, at Cocoa Beach last year, that there might be a place for another set of guidelines, this time for monitoring and reporting environmental parameters for experiments in greenhouses. This idea has been tested at a special session at GreenSys 2009 ‘International Symposium on High Technology for Greenhouse Systems’ under the aegis of ISHS in Quebec City in June. Our group awarded a travel bursary to Peter

Gill so that we would be represented at discussions at the conference. He reports that the meeting endorsed the proposal and work will start on the guidelines soon with a target for publication of the next international CE conference at Cambridge in 2012. (Eight of our members have volunteered to participate in the preparation of the guidelines.)

Light Sensor Calibration Package (LSCP)

The response to the availability of this package remains bad. It has been borrowed once in a year. Following my message to members in April two bookings have been made. Julian Franklin (and Ian Pearman) have indicated that they are going to ‘chase’ those who originally expressed an interest in the package.

Finally I thank the Executive Committee members for their continuing support of me and the UK CEUG and in particular the individuals whose names I have mentioned above and whose involvement in Group affairs will be apparent in the proceedings of the annual general meeting. In particular I value greatly the support of our secretary, J. Franklin, of our treasurer, P. Gill, and also of the Financial Sub-committee of Alan Morgan, Garry Taylor and Graham Pitkin whose recruitment of sponsors and trade exhibitors enables us to finance many of the activities that I have mentioned above. Thanks are due to Garry and his Weiss Gallenkamp colleagues who are responsible for the actual putting together of the sponsored mailing and its despatch to members. We are grateful to our 12 commercial sponsors, and to trade exhibitors for their support – it shows in the activities that we are thereby able to organise. Finally I am pleased to tell you that Laurence Benjamin has agreed to become deputy secretary to Julian Franklin.”

The report was approved unanimously (proposer: K Manger, Wakehurst Place; seconder; G Taylor, Weiss Gallenkamp)

4. Secretary’s Report (J Franklin, Rothamsted Research)

“As in previous years, the Executive Committee met twice during the year in January and July at Rothamsted. Much of the business of the committee is conducted via email messages, however the Executive Committee, as trustees of a charity, must meet twice a year to progress the business of the group. The group is grateful to Rothamsted Research for provision of its facilities for meetings.

Apart from organising the annual meeting and planning future meetings, we have also been involved in progressing the proposal for ‘Greenhouse Guidelines’. The Group sent treasurer Peter Gill to represent us at a session at GreenSys 2009 in Montreal on the proposal.

As a charity we are obliged by the Charity Commission to produce a report if our income exceeds £10,000. Both income and expenditure exceeded £10,000, of which the treasurer will give details later. I have distributed copies of the Annual Report to the Charity Commission this evening; our financial year runs from August to July, so it is difficult to produce the report in time for this meeting. Last year I only just made the deadline as you will see if you look up CEUG on the Charities Commission

website. I intend to file the report shortly after this meeting and it will be available on our website at: <http://tinyurl.com/ylqm6am>.

The Trustees report shows how we spend all our money and as a charity it is only right that we account for where all our money goes and the activities we engage in publicly but as a consequence we receive a lot of unsolicited email including offers of computers, a variety of training courses, tea-shirt production, leaflet production, offers to find unclaimed money for charities (at a cost!), that I have to sort through.

Finally I would like to report that I have sent a condolence card to the widow and family of P Iverson on behalf of the group and I would like to thank Matthew Gilroy for providing that information”

The report was approved unanimously (proposed; R Darby, Aberystwyth University; seconded; R Natt, FERA)

5. Treasurer’s Report for financial year 2008/2009 (P Gill, SCRI)

Account for Financial Year 2008-2009 (see Appendix A)

The Light Sensor Calibration Package was used on four occasions during the year (Syngenta, RWE NPower, Lancaster University & University of Birmingham.), bringing in an income of £320.00.

One-off debits and credits during the year included a travel bursary of £438.00 (flight cost) to the Treasurer to attend the NCERA-101 session on Glasshouse Guidelines at GreenSys 2009 in Canada and the printing of the Tissue Guidelines brochures/posters and their distribution to North America and Australasia.

Bank interest paid per quarter on our account has plummeted from £34.44 (balance c. £8k) to 71p (balance c. £6k) !!!

The final balance for the financial year is £8,145.95 compared with that for 2007/08 of £14,737.29. £7-8k is a typical end-of-year balance.

Final financial statement: 2007 Aberystwyth Conference (see Appendix B)

The financial statement for the conference issued at last year’s AGM included several errors on both the conference and central accounts. Expenditure on the conference account was less (mostly in a reduced staffing and portage charge) resulting in a slightly higher credit balance of £620.31 (not £605.51). Central account income from the trade stands was slightly higher at £2,810.50 (through an extra donation for one stand). The final balance on the conference account was £2,202.29, a credit to R. Darby’s hard work.

Final financial statement: 2008 Dundee Workshop (see Appendix C)

The 2008 Workshop held jointly at the University of Dundee (West Park) and the Scottish Crop Research Institute, showed a credit balance of £581.51 on the Conference Account. The income of £2,994.00 received from the eight manufacturer demonstrators was paid into the Central Account. This income was used to partly offset the travel and subsistence costs (£4,195.58) of the invited speakers and the CEUG chairman, and the cost of the AGM (£200 for the room hire and the minute

secretary's honorarium). The shortfall on the Central Account was therefore £1,401.58. Although the workshop was a technical success, financially it was littered with problems. These included the bus company going into liquidation, West Park inventing an entirely new and incomprehensible invoicing system (we were the guinea pigs!), the bank bouncing the cheque for the final payment of £10,536.60 to West Park because they had lost our signatures, and dealing with the late manoeuvring of some manufacturers.

Accounts for Executive Committee and Annual General meetings (see Appendix D)

The expenditure on the two executive meetings continues to increase, mainly due to rises in the cost of travel to Rothamsted Research. The cost of individual accommodation at Rothamsted Manor has remained fairly constant over the last few years. The number of people attending the meetings does vary and includes the organisers of the annual conferences. The total cost for 2008/09, which includes accommodation and travel was £1,592.56 compared with £1285.90 for the 2007/08 financial year.

Sponsorship: The current round of sponsorship organised by the financial sub-committee from twelve manufacturers should bring in £3,000. So far, £1,494.50 was paid in the 2007/08 financial year (June & July payments) and £1,244.00 in this financial year. Bank charges of £11.50 were levied on different accounts by both issuing and receiving banks. One payment of £250 from Philips Lighting is still outstanding.

Gift Aid and VAT Registration: Gift Aid cannot be applied to the transactions of the CEUG, principally because the CEUG is not VAT registered. VAT registration is not mandatory until sales exceed £68k, and the income of the CEUG is considerably less than this figure. Additionally, payments made from the CEUG account are generally for goods and services, to which the rules state Gift Aid does not apply. Furthermore, payments made to the CEUG are principally for mail shots and trade stand space by businesses, which are classed as goods and services. They cannot be disguised as donations, as the rules state that the donation would be considered as 'gross' and the recipient charity receives no Gift Aid (although the donating business could claim tax back). VAT registration is also complex, and we do not recommend registering for VAT.

Questions on Treasurer's Report: L Incoll (Chairman) asked to make a comment. "I would like to comment on the final deficit of the Dundee Workshop account which was very disappointing. I think we were hoisted by the speakers. They are invited so really can't be bothered booking tickets until the last minute, which means they are expensive. Our expenditure on speakers' travel was double that budgeted (nearly £2000 rather than £1000). This has forced the executive committee to say that in future we will only pay what we consider to be the cost of budget fares. We will research budget air fares or advance purchase rail tickets or, if speakers drive themselves, we will reimburse the cost of a second class rail fare. Payments will only be made in respect of invoices received; as a charity we must account for and prove all expenditure. As a direct response to our deficit, this is a change in policy which we hope will be an improvement and whilst we want to support our speakers we can not write blank cheques"

The report was approved unanimously (proposed; G Waimann, Rothamsted; seconded; B Robertson, JIC)

Report on GreenSys 2009, 14th – 15th June 2009, Quebec City, Canada (P Gill)

“I attended this conference to represent the UK CEUG in the NCERA-101-led discussion on the proposal to produce a new Guidelines brochure on ‘Monitoring and Reporting Environmental Parameters for Experiments in Greenhouses’. There were about 20 delegates present at the meeting which was introduced by A.J. Both. I was the only UK representative, as unfortunately S. Adams from Warwick HRI was giving a presentation at a concurrent session. No one was present representing the ACEWG (Australasian Controlled Environment Working Group), although A. Agostino has since offered to contribute to the group’s activities. Those from the UK who have already offered their assistance are S. Adams (Warwick HRI), I. Angus (Cambridge Scientific), D. Emmett (Hortimax), J. Franklin (Rothamsted), J. Page (Climate Controls), G. Pitkin (SCRI), B. Robertson (JIC), S. Robertson (Warwick HRI) and A. Walker (Bridge Glasshouses). It was agreed to produce a Guidelines brochure, similar to the previous ones, to be launched at the Cambridge International meeting in 2012.

The meeting agreed to form different groups (each group including an engineer) to cover each of the following main topics:

1. Radiation - growth (photosynthesis), development (photoperiod), and morphogenesis
2. Temperature - development, flower induction, vernalization, and morphogenesis
3. Water
4. Nutrients (including rooting medium) - development (particularly N and P)
5. Gases - growth (photosynthesis, respiration), and development (pollutants)

Each of the topics would be considered in relation to the following in order to formulate monitoring, reporting, and quality assurance guidelines:

- Characteristics of greenhouse structures - type, size, location, elevation, orientation, glazing, foundation/floor, porosity & adjacent environment.
- Characteristics of growing systems – crop, experiment size, benching, containers, rooting medium, irrigation & fertigation.
- Characteristics of environmental control systems – heating, ventilation, cooling, humidity, supplementary lighting, insect screening, shading, photoperiod control, CO₂ enrichment, O₂ enrichment of nutrient solution & environmental control.
- Sensor characteristics – principle of operation, precision, sampling frequency, calibration.

A.J. Both had agreed to post more information, with updates, on NCERA-101 web page <http://ncr101.montana.edu>”

D. Adair observed that he was very encouraged by the enthusiasm of the Quebec City group, so that regardless of how many were present, he feels something will come out of it. L. Incoll thanked P. Gill for representing UK CEUG at GreenSys and the 10 members who had already volunteered to work on the ICCEG sub-committee to draft the new guidelines.

6. Election of the executive committee

Three trustees (G. Taylor, G. Pitkin and M. Fuller), whose terms were completed, sought re-election. M. Pratt had resigned as a trustee. With one vacant position this gave a total of five vacancies. There were five nominees for these vacancies and they were duly elected to the committee.

Position	Person	Proposed	Seconded
Trustee	G Taylor (Weiss-Gallenkamp)	G. Pitkin	M Grassie
Trustee	G Pitkin (SCRI)	P Gill	A Thain
Trustee	M Fuller (University of Plymouth)	G Pitkin	P Gill
Trustee	G Holmes-Henderson (Syngenta)	I Southworth	W Meredith
Trustee	S Andrews (JIC)	B Robertson	P Curtis

The secretary welcomed new trustees, G Holmes-Henderson and S Andrews, to the executive committee.

7. Future Meetings

See table below for scheduled meetings to 2012 and provisional plans after 2012.

- a) *Annual Meeting on “CE’s for conservation from genotypes to ecosystems”, University of Sussex and Wakehurst Place, 2010 (M Stenning & K Manger)*
M. Stenning reported: The conference will be held on Monday 6th and Tuesday 7th of September and we invite you to spend the previous weekend enjoying the many attractions of the area.

The conference topic is a new departure, climate change and the threat of species extinction that poses means there are lots of new topics for research and big projects to do them, which will inevitably involve huge amounts of money and controlled environment systems. The conference will be all about that. The format will be similar to this year, with a lunchtime start followed by speakers and discussion in the afternoon, with an evening meal followed by the AGM. Accommodation is within the University of Sussex and the following day we will visit Wakehurst Place hosted by Keith Manger.

We have identified the speakers we would like and they have all been approached. We are hopeful that they will come. They are:

- Robin Probert, Wakehurst Place The Millennium Seed Bank
- Ola Westengen, Svalbard The gene bank under the ice cap.
- Paul Pearce-Kelly, London Zoo Using controlled environments for animals.
- Jacques Roy, Montpellier How to build a modern Ecotron.
- Marcel Visser, Heteren Ecosystems in controlled environments.

Schedule of future meetings - scheduled and provisional

Date	Venue	Comments
2010	University of Sussex and Wakehurst Place	New site. Theme: "CEs for conservation: from genotype to ecosystem". Organisers: Martyn Stenning and Keith Manger
2011	York University / FERN, Sand Hutton	Theme: "Greenhouse Technology and Practice". Organisers: Colin Abbott and Richard Natt (will be 12 years since last visit)
2012	September (second week), University of Cambridge	International Controlled Environment Conference. Theme: "?". Organiser: Colin Denston
2013	John Innes Centre, Norwich	(will be 12 years since last visit)
2014	Syngenta, Jealott's Hill	(will be 12 years since last visit)
2015	University of Lancaster	(will be 12 years since last visit)
2016	Fiftieth Anniversary Meeting University of Plymouth	(will be 11 years since last visit)
2017	Edinburgh	New site

Note: Apart from the 2016 meeting, venues after 2012 are proposals not commitments.

K Manger reported: Wakehurst Place is 25 minutes from the University of Sussex. We will have our Trade stands in the Orange Room, with the labs on either side. Beneath these is the lecture theatre and the bomb proof vault that is the Millennium Seed Bank. I can formally say now that it is the most genetically diverse place on earth, there are more genes in there than anywhere else on the planet and by the time of your visit we will have achieved our target of having 10% of the world's wild plants in there. The group tours will be similar to what you are used to, one group with the trade stands and other groups seeing the facilities and technology behind the seed bank. We have a lot of controlled environments there, cold temp rooms, dry rooms, liquid nitrogen facilities, I'm sure you will enjoy it and be able to comment or maybe even give advice. After lunch which will be in our organic restaurant, there will be tours of the garden for those that want to. We have 500 acres of botanic garden with a nature reserve, it is the most visited property owned by the National Trust, who own Wakehurst place. The seed bank is owned by Kew Gardens and they manage the grounds for the trust.

b) *Annual Meeting on "CE's for conservation from genotypes to ecosystems", University of York, FERA and Stockbridge Technology Centre, 2011 (L. Incoll & R Natt)*

L. Incoll reported: 2011 gave us the choice of Sheffield or York. The representative from Sheffield has not attended previous meetings for some years and as it is

important for the organiser to have a feel for how we run our meetings, it was therefore decided to choose York.

The theme for this conference will be “*Greenhouse Technology and Practice*”. I will be asking members to suggest topics and speakers for the scientific sessions at Fern, Sand Hutton. R. Hibbs, who is not present, has already suggested new developments in film cladding, lighting, vegetation sensors, environmental control and screens. P. Hadley has spoken to us previously on plastic films and there are enough new developments to warrant us re-visiting the subject. Someone else has suggested the title should be ‘*Glasshouses Post 2011 – What will they be like?*’ Please let us know of any other subject you think might be appropriate. Some greenhouse topics will come up again at our International Conference in 2012 as I think it’s important for our North American cousins to hear scientists like Martin Buchholz from Berlin who spoke at Aberystwyth.

The tours of facilities will be at York University and Stockbridge Technology Centre, at Cawood where experimental work in greenhouses will be on show.

c) *International Conference on CEs, University of Cambridge 2012 (J. Franklin and combined CEUG/NCERA-101 organising committee)*

J Franklin had visited Homerton & Downing Colleges as potential venues and we have provisionally booked Downing. It is well placed within walking distance of the centre of town, close to the Botanic Gardens, and the Department of Plant Sciences is nearby, as is the new Sainsbury Laboratory, for tours of facilities. Downing is a very atmospheric college with a new lecture theatre in Georgian style and space for a trade exhibition. The formal meal menu is very good and we are sure the college will provide a good spread. The meeting is still not budgeted but prices are reasonably competitive and as the rooms are doubles we hope that people sharing could keep your costs down.

L Incoll has canvassed NCERA-101 members for ideas on topics for our speakers and they have made suggestions which he will send out on JISCmail for your feedback.

M. Fuller (Plymouth) and J. Franklin are organising a post-conference tour, so anyone with suggestions for East Anglian places to visit with outstanding examples of CE practice, either commercial or research based, should contact them.

G Waimann (Rothamsted) asked if partners will be encouraged to attend? J Franklin replied that some overseas visitors had come with partners in 2001, however it was not customary for members to attend our meetings with partners. It might be possible to organise a separate programme for partners should there be sufficient numbers, but the disadvantage is attendees wanted to go on the tours with their partners instead of attending the conference. Downing has double bedrooms and they offer a guided tour.

8. Light Sensor Calibration Package (J Franklin)

J. Franklin reported that there have been four requests for hire of the package in the last year, which means only a total of seven since the package was purchased. Each time it is used there are outgoing postage costs and I. Pearman has to re-calibrate the system against our local standard on its return. So we have yet to break even on the

purchase of the package. Julian Franklin also reported that additional costs will be incurred as the package will need to be sent back to Skye annually for calibration against their standard light source.

B Robertson (JIC) asked if the package information was on the CEUG website. J Franklin replied that it is, so it is accessible to both members and non-members. L Incoll (University of Leeds) commented that this accessibility fits in well with our charitable status as this is a public service offered to all, not just to our members.

9. Open discussion on the following CE topics

Lighting

1. Sulphur-plasma lighting: S Andrews (JIC) told the group about a trial at JIC of a new sulphur-plasma lamp. The lamp is a discharge lamp with no element, just argon gas and elemental sulphur which is excited with a magnetron (as in microwave ovens) so it vaporises to the gaseous phase which is then spun within the lamp to prevent contact of the plasma with the sides. The lamp provides an intense light that, according to the measurements of the manufacturer, has a spectral distribution close to sunlight. There were problems in the beginning with reliability and spatial distribution of light. Initially the 'parabolic' reflector was too focused but once the angle had been changed to 120° to get an even spread of light, growth of test plants appeared better.

K Manger (Wakehurst Place) asked what the energy rating of the light was. S Andrews (JIC) replied that the manufacturer claims that it is 1000 W and that it should have a 50,000 h life. B Robertson (JIC) said that initial results showed a 25% improvement in light output per watt compared with sodium or HQI (metal halide) lamps. M Stenning (University of Sussex) asked how it will compare with LED technology. S Andrews (JIC) replied that currently it is 'streets ahead', even of a mixed LED array. B Robertson (JIC) said it is 25% better than HQI and sodium lamps.

J Franklin (Rothamsted) and G Taylor (Weiss Gallenkamp) commented that delivering acceptable uniformity of distribution of light is going to be an issue when using such a physically small, but high power source. S Andrews (JIC) replied that this lamp lends itself to the transfer the light to a CE room via light tubes, while the lamp itself remains outside the CE room and any input energy lost as heat is emitted outside the room.

S Andrews (JIC) said that apparently the technology has been around for years. L Incoll (University of Leeds) said it was an interesting report but he had heard it all, before, including light tubes, when he went to the NCR-101 annual meeting at Cornell in 1999. Indeed plasma lighting was first developed in the early 1990s in the US. NCR-101 member D. Krizek (USDA, Maryland) published with colleagues two refereed papers in *Biotronics* in 1998 on plasma lighting, the first a complete and thorough technical assessment of the spectral properties of the lamp in comparison with high pressure sodium and metal halide lamps, the second a complete comparison of uniformity of photon flux and growth of plants in comparison with conventional metal halide lighting. Subsequently T. Tibbitts (University of Wisconsin) had told him that the company in the US had abandoned its commercialisation as there were too many problems with the reliability of the magnetron.

D Adair (Conviron) said he had met the developers who were very clever techie types but was unsure if they would make it to a final product with the risks to safety and reliability that a magnetron presents.

B Robertson (JIC) said that they have seen the product come on and it now looks like it is mass produced, the latest version looks really promising but as they have signed a confidentiality agreement with the company they can not divulge much more. S Andrews (JIC) reported that there is a photo of the lamp in their CE on the manufacturer's web site, so he guessed that if anyone wants to come and see it for themselves, then it would be OK.

2. LED lighting: A Cookson (University of Aberystwyth) reported that in experiments he had conducted with LEDs, they set up two cabinets, one with LED arrays, the other with fluorescents, they monitored both and found that LEDs used 17% less power for the same amount of light and the same amount of growth, though it was not known yet if chemical composition differed. He thought LEDs are the future but they are not there yet. B Robertson (JIC) remarked that researchers required consecutive batches of identical plants from week to week. He observed that plants did not look right under LEDs due to the purple/pink colour, you have to take them out of room and look at them under fluorescents. However plants do not grow differently, they just look different. He had been told that it was possible to request green LED arrays, A Cookson agreed.

D Adair (Conviron) observed that LEDs are not tuned to the CE market because it is too small for most manufacturers. Lumigrow in San Francisco, CA, are an exception as they are directly addressing the needs for CE. A Cookson University of Aberystwyth) said that there is a small company, ECOLED (<http://www.ecoledlight.co.uk>), who get theirs from China; he had tried three different types with variable prices. J Franklin (Rothamsted) remarked that it is one of the problems with LEDs, there are so many brands on the market. S Andrews (JIC) asked if anyone is doing any work on LEDs, it seems they are not targeting CE users? J Franklin (Rothamsted) said Philips are targeting the tissue culture side for their LEDs, they know they are not bright or efficient enough for CE use.

The discussion moved to spectral distribution of LED light. G Taylor (Weiss Gallenkamp) asked are users happy with arrays that only focus on producing light in the red and blue for photosynthesis, when we need other wavelengths in a broad spectrum for determining plant morphology. M Stenning (University of Sussex) observed that colour LEDs emit light in narrow wavebands. G Taylor (Weiss Gallenkamp) replied yes but LEDs are not efficient for a broad spectrum lamp, the ideal situation is white light producing light across the spectrum. The spectra of white light produced by LEDs from RGB (red, green, and blue LEDs called multi-coloured white) LEDs and less efficient phosphor-based LEDs (where a phosphor broadens the spectrum of a blue or UV LED) are quite different.

Refrigeration

K Manger (Wakehurst Place) reported that they have a modern refrigeration system (a scrolling compressor, pack system). It currently runs four 50 m² cold rooms using only two of the seven compressors which are connected in series. There is built in

capacity to satisfy refrigeration needs for the next ten years. We are very impressed as it saves a lot of energy. B Robertson (JIC) asked where the energy was saved? K Manger (Wakehurst Place) replied that it is a water-cooled system which uses a heat exchanger to recover the waste heat extracted from the cold rooms and uses it to preheat the 'domestic' hot water. G Waimann (Rothamsted) observed that recovery of so-called 'waste' heat is a key element of refrigeration system efficiency and that with heat recovery from the hot gas alone by the use of superheaters in line you can produce 60°C hot water.

G Waimann (Rothamsted) drew attention to developments in refrigeration regulations. Virgin R22 will not be available from 31st December 2009, nor can it be stockpiled for use; it will only be possible to use reclaimed refrigerant in an existing system, and then only for five years. You will have to pay to get rid of it. A Cookson (University of Aberystwyth) remarked that recovered, reclaimed or recycled, even now R22 will be hard to get rid of. G Waimann (Rothamsted) said that there needs to be a strategy in place to deal with R22 systems, not doing anything is not an option. BOC are ring fencing recovered R22 for big companies who are paying up-front to ensure some supply.

Heating, reclamation and energy management

S Andrews (JIC) spoke regarding carbon trading / audit, inspection of refrigeration and air conditioning – energy performance certificates. He reported that recent new legislation requires all air conditioning plant to be assessed (by an approved assessor) and be issued with an Energy Performance Certificate. There has been some discussion in the past about whether the cooling in CE rooms would be regarded as air conditioning and therefore require this assessment. He and G Waimann (Rothamsted) had been informed that it is not and is therefore exempt from assessment.

Plant growth, pests and diseases

K Sawford (Brooms Barn) asked, regarding a discussion on JISCmail in June about glasshouse fumigation, if anyone had an alternative to nicotine. He wanted something to treat aphid infected plants with, but due to the nature of the particular work the treatment had to be non-systemic, or of low persistence, as aphids would be reintroduced to the treated plants four weeks later. G Holmes Henderson (Syngenta) suggested applications of Aphox™ using a fogger for killing aphids. J Franklin (Rothamsted) reported that they have used CO₂ to kill aphids in micro-chambers but they have not scaled that up to glass house size of enclosure.

Health and safety

J Franklin (Rothamsted) referring back to earlier discussion about sulphur-plasma lighting noted that sulphur-plasma lamps are very bright, and that maybe manufacturers should look at their safety.

L Incoll (University of Leeds) reminded members of M Penrose's (HSE) question on our JISCmail discussion forum about "proposed new health and safety regulations on artificial optical radiation" to which only C Fryars (CLF Plant Climatics) had responded regarding high intensity LEDs. No mention had been made by members of sulphur-plasma lighting. He suggested that informed members should bring sulphur-plasma lighting to M Penrose's attention either directly or by replying to his message of the 20th August 2009.

10. Any other matters not included in the above agenda items (including the Executive Officers' reports)

L Incoll asked that the group record their appreciation of the work J Franklin and his team of helpers in making this such a successful and enjoyable meeting.

J Franklin expressed his personal thanks to J McCarthy and E Blackie for all their help with organising and ensuring the smooth running of this conference

The group then showed their appreciation by applause to the local team.

The meeting closed at 22:20 h.

E Blackie, Minutes Secretary
13th October 2009

Annexe A

UK Controlled Environment Users' Group
Accounts for the financial year 1st August 2008 to 31st July 2009

Royal Bank of Scotland account, Dundee (10081698)

Balance b/f at 1st August 2008		£14,737.29
INCOME		
2008 Dundee Workshop	£9,847.75	
2009 Rothamsted Conference	£2,101.80	
2009 Mailing sponsorship(x5) (+ P.O. refund)	£1,265.30	
Light Sensor Calibration Package	£320.00	
Guidelines brochures and posters (copies for ACEWG and NCERA-101)	£548.61	
Bank interest	£85.73	
		£14,169.19
EXPENDITURE		
2008 Dundee Workshop	£12,437.65	
2008 Dundee Workshop: speakers & chairman	£4,195.58	
2008 Executive Committee meetings	£1,382.71	
2008 AGM	£200.00	
2009 Rothamsted Conference	£500.00	
2009 Mailshot	£408.96	
2012 Cambridge Conference	£51.50	
GreenSys Conference – secretary (travel bursary)	£438.00	
Guidelines brochures and posters (printing & distribution)	£742.65	
Office services (stationery, etc.)	£390.14	
Treasurer's expenses	£13.34	
		£20,760.53
Balance c/f at 31st July 2009		£8,145.95

Peter Gill & Graham Pitkin
16th August 2009

Annexe B

UK Controlled Environment Users' Group
Financial statement for the Aberystwyth meeting
11th & 12th September 2007

1 CONFERENCE ACCOUNT	
INCOME	
Registration	£1,034.00
Accommodation & subsistence	£5,063.59
	£6,097.59
EXPENDITURE	
Reception	£165.58
Photocopying (paper & toner)	£37.31
1 st mailing	£106.48
Coach	£130.00
Arts Centre dinner	£1,398.50
University accommodation/residence charges	£3,382.76
Evening meal (Monday) refund to R. Darby	£16.40
IGER teas	£88.13
Staffing & portorage	£64.52
Chairman's visit to Aberystwyth	£87.60
	£5,477.28
BALANCE	£620.31
2 CENTRAL ACCOUNT	
INCOME	
Trade stands - 7 donations @ £350; 1 @ £360.50	£2,810.50
	£2810.50
EXPENDITURE	
Minute Secretary for AGM	£60.00
Room hire – Brynamlwg – for AGM	£20.00
Speakers' accommodation & subsistence	£300.75
Speakers' travel expenses	£227.46
	£608.21
BALANCE	£2,202.29

Peter Gill & Graham Pitkin, 13th June 2008

UK Controlled Environment Users' Group
Financial statement for the Dundee workshop
7th & 10th September 2008

1 CONFERENCE ACCOUNT	
INCOME	
Registration	£1,296.00
Accommodation & subsistence	£14,147.75
Sponsorship - reception & travel	£800.00
Airport shuttle	£110.00
Jute museum	£33.00
	£16,386.75
EXPENDITURE	
Photocopying (paid by SCRI)	£0.00
First & second mailing (paid by SCRI)	£0.00
Document wallets & badges	£12.72
Coach & minibus hire, fuel & parking	£557.20
West Park accommodation & subsistence (delegates & demonstrators)	£11,870.16
West Park subsistence (registration steward)	£13.50
Conference dinner reception	£210.00
Conference dinner (delegates & demonstrators)	£2,507.87
Conference dinner (registration steward)	£54.52
Afternoon refreshments (delegates & demonstrators)	£384.22
Afternoon refreshments (SCRI stewards)	£56.40
Chairman's visit to Dundee for planning	£108.65
Jute museum	£30.00
	£15,805.24
BALANCE	£581.51

2 CENTRAL ACCOUNT	
INCOME	
Eight manufacturer demonstrators at £375 each (less bank charges)	£2,994.00
	£2,994.00
EXPENDITURE	
Travel expenses (speakers & CEUG chairman)	£2,124.00
West Park accommodation & subsistence (speakers & CEUG chairman)	£1,582.54
Conference dinner (speakers & CEUG chairman)	£436.16
Afternoon refreshments (speakers & CEUG chairman)	£52.88
Minute Secretary	£50.00
Room hire - West Park	£150.00
	£4,395.58
BALANCE	-£1,401.58

Peter Gill & Graham Pitkin,
26th May 2009

Annexe D

UK Controlled Environment Users' Group
Accounts for the financial year 1st August 2008 to 31st July 2009

Cost of Executive Committee meetings & AGM

AGM held at Dundee on 8th September 2008		
Minutes & auditor	£59.85	
Room hire – West Park	£150.00	
		£209.85
Meeting held at Rothamsted Research on 5th February 2009		
Travel	£481.11	
Accommodation	£195.80	
		£676.91
Meeting held at Rothamsted Research on 2nd June 2009		
Travel	£418.03	
Accommodation	£287.77	
		£705.80
Total		£1,592.56
<i>(2007/08)</i>		<i>(£1,285.90)</i>

Peter Gill & Graham Pitkin
8th August 2009