

CENTRE FOR DOCTORAL TRAINING  
NEW AND SUSTAINABLE  
PHOTOVOLTAICS

# **CDT-PV Board Meeting**

University of Liverpool in London

2<sup>nd</sup> July 2015

Collated Documents

## Agenda

1. Apologies for absence
2. Minutes + comments from previous meeting
3. Matters arising
4. Chairman's business
5. Financial report (RT)
6. Student Progression Report Mechanism (AW)
7. CDT-PV Showcase event, Nov 2015 - Discussion
8. Industrial advisory board composition (KD)
9. Cohort 2: Recruitment update (AW)
10. Cohort 1: Training/Assessment Summary (RT)
11. Cohort 1: Student Feedback
12. Cohort 1: Training and events in Years 2 & 3. Discussion
13. Dates for 2015-2016 cohort (RT)
14. Dates of next meeting

**EPSRC Centre for Doctoral Training in New and Sustainable  
Photovoltaics**

**PV CDT Board Meeting  
9am, Tuesday 4<sup>th</sup> November 2014  
Foresight Centre, University of Liverpool**

**DRAFT MINUTES**

**Present:**

Ken Durose (KD, Liverpool), (Chair)  
Alison Walker (AW, Bath)  
Neil Greenham (NG, Cambridge)  
Moritz Riede (MR, Oxford)  
Giles Richardson (GR, Southampton)  
David Lidzey (DL, Sheffield)  
Sharon Henson (SH, Loughborough)  
Robert Treharne (RT, Liverpool)  
Peter Yates (PY, Student rep, Liverpool)

**In Attendance:**

Adam Mannis (AM, Liverpool)  
Suzanne Fitzpatrick (SF, Liverpool, taking minutes)  
Stuart Boden (Southampton)

**1) APOLOGIES FOR ABSENCE**

Mike Walls (Loughborough); Henry Snaith (Oxford).

**2) REPORTS**

Reported: Brief updates from KD, AW, RT. Recruitment for 2014 is complete. The cohort had started the Liverpool module. Course information is available online at [www.cdt-pv.org](http://www.cdt-pv.org)

**3) BOARD COMPOSITION (KD)**

Noted: The composition of the committees of the CDT are described in the Legal Agreement for reference.

**a) CDT Board**

Reported: The students had chosen Peter Yates to represent them at the Board, and intended to rotate their rep. Peter was welcomed.

Noted: One industry rep. may be invited to the Board.

**b) Industrial Advisory Board**

Discussed: Nominees for the Industrial Advisory Board. (The Director plus one other should serve, although during the meeting the Board was under the impression this might be the Director plus two). KD encouraged every academic lead within the CDT to have a role, and the responsibility be spread around. (AW would serve if required)

Action: ALL please make suggestions of a member to serve on the IAB.

**c) Advisory Board Members**

Discussed: Nominations for three members to be put in place within three months of the effective date of the Agreement. Imperial College suggested and met with general approval (James Durrant, Jenny Nelson or NEDaukes perhaps). Suggestions to be solicited from academic leads – by e-mail

Action: ALL nominations are requested from the Board – please send them to RT.

#### **4) LEGAL AGREEMENTS (KD)**

Reported: The Legal Agreements are in an advanced stage of preparation and that although there had been delays, agreements have been circulated to all partners for final comments.

Discussed: Publication clauses (11.2).

Agreed: Clause 11.2, and any contingent clauses are to be removed.

Action: KD to request to Karin Alecock (Liverpool legal team contact) that this be done.

#### **5) BUDGET (KD and RT)**

Reported:

i) UoL will issue a budget to each partner for training, fees, stipend and RTSG. A Purchase Order will be issued annually, with partner institutions to invoice quarterly in arrears.

ii) RT advised the budget will be reviewed after Year 1.

Discussed: Accommodation arrangements

Agreed: UoL will retain the entire accommodation budget and will make accommodation arrangements for all events.

Discussed: Welcome event at each training module in Year 1.

Agreed: It is desirable to hold such a welcome and the budget will provide for it.

Reported (PY): the students requested some guidance on expenses.

Action: RT to provide guidance.

Reported (PY): the students requested detailed times for the future events in order to allow them to book travel.

Agreed: Details to be established and circulated.

#### **6) TRAINING**

*a) Update on modules from each partner (red, amber, green)*

Reported in order of delivery:

i) Liverpool – Green. Currently hosting students.

ii) Cambridge – Amber. Programme structure identified, final stages of organising.

iii) Sheffield – Amber to Red. Programme structure identified. Industry (Ossila) have withdrawn from their commitment to host a workshop. DL advised there is minimal support from the University of Sheffield in organising the events. DL welcomed assistance and guidance from partners. RT and AM to assist if possible by providing course materials as examples.

Action: RT to forward course materials to DL e.g. team challenge ideas or examples.

iv) Southampton – Amber. Programme structure identified.

v) Bath – Green.

vi) Oxford – Amber. Outline programme identified, however currently experiencing internal changes. Will re-assess next year taking into account the programme as a whole and previous (partner) activities.

**Action:** NG to forward Entrepreneurship syllabus to AW so as to avoid duplication.

- **Action is for Cambridge.**

vii) Loughborough – Green. Programme planned.

Discussed: Concern that the training element will cause students to over-run 4 years and incur HEFCE penalties for the institutions (GR).

Agreed: Advice to be sought from EPSRC.

Discussed : Timing of first year assessment for feed in to local progression processes (AW). (One university had discussed delaying the process until the 18 month mark)

Noted: For this CDT the Academic Director will prepare reports on student progress towards the end of year 1 and pass them to the host institutions.

Discussed: Timing of Showcase and Induction and whether they should co-locate

Agreed: UoL will host first event of each cohort to include the annual showcase and induction event, and will include participation from current students and incoming students.

## **7) PROPOSALS FOR 2015 STUDENTSHIPS**

### *a) Timetable and mechanism*

Discussed: last year's arrangements and any tuning necessary.

Agreed:

i) To run essentially the same process as 2014/2015 recruitment.

ii) Recommendations from the Project Selection Sub-Group to the Board to include some flexibility or choice for the Host, especially where this will help with the local recruitment process.

iii) Partners are encouraged to exercise some restraint with the number of proposals, with last year's process indicating that high numbers are associated with some lack of strategic planning.

iv) Team leaders will be responsible for circulating the call within their own university and will be point of contact for internal enquires.

v) Deadline for receipt of proposals is to be one month from call issue, with this minute being a "head's up" that the Call is imminent.

Action: AW to circulate call.

### *b) Promotion and advertising*

Agreed: The advertising mechanisms to be updated for 2015 intake.

Action: ALL invited to make suggestions for advertisement of projects to RT please

### *c) Industrial studentships*

Noted: there are no industrially supported projects in the first cohort.

Agreed: Industrial involvement to be encouraged for future cohorts.

## **8) DATE OF NEXT MEETING**

The next meeting will take place at Univ. Loughborough during their module (possibly 13<sup>th</sup> May 2015).

# CDT-PV Financial Report June 2015

R. Treharne

## Contents

- Capital Equipment: Final Update
- Budget/Spending 2014/15 Review
- Cost Recovery Mechanism

## Capital Equipment: Final Update

The following table lists the procurement status of equipment in relation to the CDT-PV component of EPSRC Capital Equipment grant [EP/M507301/1](#).

Item	Location	Address	Date of first use	Key users	Costs reclaimed from UoL?
Cary 5000 UV/Vis/NIR Spectrometer & VASRA	Bath	Building 5W, University of Bath, Claverton Down Road, Bath. BA2 7AY.	18/12/15	E Da Como	Yes
Fluorescence Spectrometer	Cambridge	Room K20, Kapitza Building, Cavendish Laboratory, J. J. Thomson Avenue, Cambridge CB3 0HE.	27/2/15	N Greenham	Yes
Solatron DSSC Impedance Analyser	Liverpool	Lab1, Stephenson Institute for Renewable Energy, L69 7ZF.	1/3/15	J Major, L Phillips	NA
Impedance Analyser and Closed Cycle Cryostat	Loughborough	GX4, CREST PV laboratories, Garendon Wing, Holywell Park, Loughborough University, LE11 3TU	28/2/15	J Bowers, P Kaminski, F Bittau, C Potamialis	Yes
Non-Scanning Kelvin Probe	Oxford	Wolfson Cleanroom, Clarendon Laboratory, Parks Road, Oxford. OX1 3PU.	15/3/15	H Snaith	Yes
Bruker DXT Surface Profilometer	Sheffield	Lab C21, Hicks Building, Hounsfield Road, Sheffield S3 7RH	12/1/15	D Lidzey, B Freestone, M Stringer	Yes
Bentham EQE	Southampton	ECS, Faculty of Physical Sciences and Engineering,	18/5/15	S Boden, Pavlos	Yes

system		SO17 1BJ		Lagoudakis	
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# Budget/Spending 2014/2015

## Relevant Documents

- Full CDT-PV budget
- Training Delivery Breakdown (per event/student)

## Treemap of 2014/2015 budget

Left mouse click = forward, right mouse click = back



## Spending (Actual)

Awaiting Data

# Cost Recovery Mechanism

Following the execution of the CDT-PV collaboration agreement (March 2015) UoL has issued purchase orders to all partners for them to recover costs associated with EPSRC funded student stipends/fees/consumables and all other costs incurred to date. All future costs must be claimed for **quarterly, in arrears**.

#### **Purchase Orders and Guidance Notes**

- Bath | [Purchase Order](#) | [Guidance Notes](#)
- Cambridge | [Purchase Order](#) | [Guidance Notes](#)
- Loughborough | [Purchase Order](#) | [Guidance Notes](#)
- Oxford | [Purchase Order](#) | [Guidance Notes](#)
- Sheffield | [Purchase Order](#) | [Guidance Notes](#)
- Southampton | [Purchase Order](#) | [Guidance Notes](#)

#### **Other Relevant Documents**

- Executed CDT-PV Collaboration Agreement: Financial Management



## LOUGHBOROUGH UNIVERSITY

Finance Office

LOUGHBOROUGH  
Leicestershire  
LE11 3TU

**VAT Reg No:** GB 673 5988 75

**Order Date:** 28/04/2015

**Supplier Id:** 94

**Customer Ref:**

**Contact:** Ms Suzanne Fitzpatrick

 +44



## DELIVERY ADDRESS:

University of Liverpool  
Faculty of Science & Engineering Office  
Room 2/018, 2nd Floor  
Central Teaching Hub  
LIVERPOOL  
L69 7BX

## INVOICE ADDRESS

Faculty of Science & Engineering Office  
Room 2/018, CPD Suite  
2nd Floor Central Teaching Hub  
The University of Liverpool  
Liverpool  
L69 7ZF

Award Ref: EP/L01551X/1 - EPSRC CDT in New and Sustainable  
Photovoltaics. PO 1: 2014/2015.

Page 1 / 1

Qty	Pack Size	Catalogue Number / Description	Unit Price £	Amount £
1.00	-	Year 1, Quarter 1 (Oct-Dec) fees and stipend for student Vincent Tsai	4,464.75	4,464.75
1.00	-	Year 1, Quarter 2 (Jan-March) fees and stipend for student Vincent Tsai	4,464.75	4,464.75
1.00	-	Year 1, Quarter 3 (April-June) fees and stipend for student Vincent Tsai	4,464.75	4,464.75
1.00	-	Year 1, Quarter 4 (July-Sep) fees and stipend for student Vincent Tsai	4,464.75	4,464.75
1.00	-	RTSG/Consumables budget for duration of PhD studentship for student Vincent Tsai (see Guidance Note 1)	14,000.00	14,000.00
1.00	-	Partner Costs: Total start-up and set-up costs (START-UP#, LBOR) (see Guidance Note 2)	4,286.00	4,286.00
1.00	-	Partner Costs: Year 1, Delivery Training (DEL-TRAIN, LBOR) (see Guidance Note 3)	7,000.00	7,000.00
1.00	-	Partner Costs: Year 1, Delivery Travel (DEL-TRAVL, LBOR) (see Guidance Note 4)	1,143.00	1,143.00
1.00	-	Partner Costs: Year 1, Delivery Sustenance (DEL-SUSTN, LBOR) (see Guidance Note 5)	4,160.00	4,160.00
			Order Total £ (excluding vat)	48,448.00

This order is subject to The University of Liverpool's General Conditions of Purchase available from the Head of Procurement, University of Liverpool, Foundation Building, 765 Brownlow Hill, Liverpool L69 7ZX or on the procurement web site: <http://www.liv.ac.uk/procurement>. You should note that the terms contain important exclusions to which we expressly draw your attention. The supplier will be deemed to have accepted and be bound by these conditions to the exclusion of any supplier's conditions of sale including without limitation any that may be written on quotations (even if referred to on this order) or invoices unless otherwise agreed in writing by an authorised officer of the University. Please note that assistance with unloading is not provided for safety reasons.

**Failure to quote the University of Liverpool Purchase Order number could delay payment.**

**EP/ L01551X/1 - EPSRC Centre for Doctoral Training in New and Sustainable Photovoltaics**

**Invoice Guidance Notes**

<b>Ref</b>	<b>Guidance Note</b>
1. RTSG/ Consumables	<p>RTSG is to be reclaimed quarterly in arrears (based on actual spend). A statement of expenditure detailing actual expenditure incurred during that period is to be attached to the invoice. We do not require copies of original invoices, however they should be available to The University of Liverpool on request.</p> <p>Please note the RTSG budget is the total amount – we do not expect the student to spend this total amount in year 1. We expect that the students will spend a percentage of the cost per year however we are aware that students may wish to spend money on a bulk item (i.e., an international conference etc.) which is acceptable, however any large expenditure needs to be agreed with the CDT Academic Manager, Dr Rob Treharne, in advance and conference costs need to be agreed in advance of registering/purchasing.</p> <p>A new Purchase Order will be raised annually, which will detail the balance of the RTSG allocation.</p> <p>Please note: - RTSG allocation must be utilised to purchase items for the benefit of the individual's PhD research project and in line with RCUK Terms and Conditions.</p>
2. Partner Costs: Total start-up and set-up costs (START- UP#, LBOR)	<p>To be reclaimed quarterly in arrears, based on actual expenditure as per the Agreement. A statement of expenditure detailing actual expenditure incurred during that period is to be attached to the invoice. We do not require copies of original invoices, however they should be available to The University of Liverpool on request.</p> <p>Please note: - Start-Up funds are to be utilised fully in Year 1.</p>
3. Partner Costs: Delivery Training (DEL-TRAIN, LBOR)	<p>To be reclaimed quarterly in arrears, based on actual expenditure as per the Agreement. A statement of expenditure detailing actual expenditure incurred during that period is to be attached to the invoice. We do not require copies of original invoices, however they should be available to The University of Liverpool on request.</p> <p>Please note: - Funds are to be spent on training activities that benefit the entire</p>

	CDT cohort, and not individual students only. The later would be recovered from the student's RTSG allocation.
4. Partner Costs: Delivery Travel (DEL- TRAVL, LBOR)	<p>To be reclaimed quarterly in arrears, based on actual expenditure as per the Agreement. A statement of expenditure detailing actual expenditure incurred during that period is to be attached to the invoice. We do not require copies of original invoices/expenses, however they should be available to The University of Liverpool on request.</p> <p>Please note:</p> <ul style="list-style-type: none"> <li>- average cost per student for travel to training events - £71</li> <li>- claims for use of taxis / bicycle hire are permitted.</li> </ul>
5. Partner Costs: Delivery Sustenance (DEL- SUSTN, LBOR)	<p>To be reclaimed quarterly in arrears, based on actual expenditure as per the Agreement. A statement of expenditure detailing actual expenditure incurred during that period is to be attached to the invoice. We do not require copies of original invoices/expenses, however they should be available to The University of Liverpool on request.</p> <p>Please note:</p> <ul style="list-style-type: none"> <li>- expenses for sustenance are only to be incurred during training events</li> <li>- allowance of £28.00 per day, per student</li> <li>- expense claims for the purchase of alcohol are not permitted</li> </ul>

# C1 Training Review

R. Treharne, May 5 2015

## Contents

- Recorded Training Activity
- Assessment List

## Recorded Training Activity

Location	Training Elements	Contact Time (Hours)	Tag
Liverpool	Lecture Course: Fundamentals of Photovoltaics	9	#LIVlectures
Liverpool	Lecture Course: Problems Classes	4	#LIVproblems
Liverpool	Labs Practicals	11	#LIVlabs
Liverpool	Workshop: Transparent Conductors	4	#LIVtco
Liverpool	Team Challenge: Presentations	3	#LIVchallenge
Liverpool	Podcasting	1	#LIVpodcast
Liverpool	Industry Showcase	8	#cdtpvshowcase
Cambridge	Lecture Course: Renewable Energy	11	#CAMlectures
Cambridge	Lecture Course: Problems + Self Study	2	#CAMproblems
Cambridge	Workshop: Energy Calculator	2	#CAMwkshp
Cambridge	ETECH Entrepreneurship Course (JBS)	30	#CAMetech
Cambridge	Visit to Eight19	3	#CAMEight19
Sheffield	Lecture Course: Experimental Techniques	7	#SHFlectures
Sheffield	Lab Rotation	18	#SHFlabs
Sheffield	Workshop Statistics	3	#SHFwkshp
Southampton	Lecture Course: Mathematical Methods	5	#SHFlectures
Southampton	Lab Rotation: Experiments	12	#SOTlabs

Southampton	Lab Rotation: Extended Analysis	6	#SOTanalysis
Southampton	Team Challenge	5	#SOTchallenge
Southampton	Cell Fabrication: Perovskite Devices*	3	#SOTcellfab
Bath	Lecture Course: Electrochemical Techniques	4	#BTHechem
Bath	Lecture Course: Materials Modelling	4	#BTHmatmod
Bath	Visit to Bath Abbey	4	#BTHabbey
Bath	Lecture Course: Polymer-fullerene Solar Cells	8	#BTHpolycell
Bath	Workshop: Business Skills	5	#BTHbusiness
Bath	Team Challenge: Bath Abbey	10	#BTHchallenge
Bath	Round Table Discussions	4	#BTHdiscuss
Oxford	Lecture Course: Perovskites etc	10	#OXFlectures
Oxford	Visit to OxfordPV	3	#oxfordpv
Oxford	Lab Experiments	25	#OXFlabs
Oxford	Workshop: How to write a paper	1	#OXFwkshp
Oxford	Training Review and Feedback	5	#OXfeedback
Loughborough	Lecture Course: Manufacturing and Large Scale PV	7	#LBRlectures
Loughborough	Lab Rotation: Module manufacturing/characterisation	13	#LBRlabs
Loughborough	Workshop: Introduction to LabView	7	#LBRlabview
Loughborough	Workshop: Introduction to MatLab	2	#LBRmatlab
Loughborough	Team Challenge	4	#LBRchallenge
Loughborough	Visit to Wymeswold Solar Array	4	#LBRvisit

\*Cancelled

**Total contact time = 267 hrs**

Average (per module) = 38 hrs, Max = 48 hrs (Cambridge), Min = 23 hrs (Southampton)

# Assessment List

Title	Description	Location	Feedback?	Points
Exam	1 hr formal exam on "Fundamentals of Photovoltaics" lecture course	Liverpool	S	7.5
Lab Report	Informal report summarizing lab activities during module	Liverpool	V	7.5
Team Challenge	Group work + presentation on topic: "Thin-Film Photovoltaics for Terawatt Generation"	Liverpool	W, P	7.5
Podcasting	5 minute (mimimum) podcast for public audience on PV (or related topic)	Liverpool	V	7.5
Team Challenge (ETECH)	Investment Pitch	Cambridge	W	15
Exam	Open book exam on "Renewable Energy" lecture course	Cambridge	S	15
Lit. Assignment 1	Comparing characterisation techniques from two sources	Sheffield	W	5
Lit. Assignment 2	Comparing characterisation techniques from two sources	Sheffield	W	5
Lab Report	Detailed report on single lab component	Sheffield	W	10
Lab Report	Detailed report on single lab component	Sheffield	W	10
Exam	1 hr multiple choice exam on "Mathematical Methods" lecture course	Southampton	S	10
Team Challenge	Group work + presentation on various topics	Southampton	V	10
Lab Viva	Extended analysis and viva on various characterisation techniques	Southampton	V	10
Lab Challenge	Group competition to achieve best results for Electrochemical Impedance lab	Bath	V	7.5
Lit. Assignment	Paper review + group discussion	Bath	V, P	7.5
Bath Abbey	Design PV system for roof of Bath Abbey using PVSYST software	Bath	V	7.5
Lab Report	Detailed report on Organic Photovoltaics lab activity	Bath	V	7.5

Journal Article	Write a real paper based on experimental data acquired during training	Oxford	V, W, P	30
Group presentation	Technical presentation based on experimental work conducted throughout module	Loughborough	V, W, P	30

**Points Total: 210**

Feedback Key: P = peer assessed, S = score, W = written feedback, V = verbal feedback.

# C1 Feedback

R. Treharne, May 5 2015

## Contents

- Feedback Summary
- Collated Feedback Responses
- Comments

## Feedback Summary

reset

bath ▼

red = negative comment, blue = positive comment

## Collated Feedback Responses

Students have been encouraged to provide anonymous feedback on core-level training throughout the year. Please click on the links below to review the feedback.

- Liverpool
- Cambridge
- Sheffield
- Southampton
- Bath
- Oxford
- Loughborough

## Comments (RT)

The following comments summarise the collated verbal feedback given to Rob by the cohort throughout the year.

### Liverpool

- Lecture course in first week deemed to be useful and well delivered.
- Students agreed that the associated problems classes were useful in reinforcing lecture course content and argued that this should have been sufficient to demonstrate



their understanding rather than having to to a formal examination too.

- Students got overly stressed about the exam after the first week and many complained that it ruined their training experience.
- Lab practicals in second week were less popular with students feeling that the activities were too rushed.
- Students would have appreciated more time to have made better measurements and present a more detailed writeup for each lab activity.
- Students generally agreed that the second week of training was too hectic with too much assessment.

## **Cambridge**

- Accommodation was good. Will be booked again.
- Cohort interaction suffered due to having to work over the weekend at JBS. This was very unpopular with the students.
- Renewable Energy Lecture course was enjoyed and considered extremely useful.
- ETECH course at JBS received a significant amount of negative feedback.
- Many suggested that the ETECH course might be more appropriate as a 2nd or 3rd year workshop.
- Many of the students were frustrated at not having been taught anything about OPV, this being a large research focus at Cambridge.

## **Sheffield**

- Students very happy with accommodation. Will book this again next year.
- All students agreed that the literature review assessment was very useful.
- Many students complained that the lectures provided were badly delivered and aimed at a level too low for them.
- Students generally enjoyed the labwork but again felt that the scripts were too prescriptive and felt more like an undergraduate style lab.
- Students would like to have learnt more about Prof. Lidzey's own research
- Students would like to have had the opportunity for a tour of Osilla
- Statistics workshop was received positively overall

## **Southampton**

- Accommodation: Hotel was the only real option this year but will seek an alternative solution for the next cohort. Very expensive and students missed sharing kitchen facilities. Cohort interaction suffered as a result
- Lecture course was enjoyed by most students. Many of the students, while acknowledging that the content of the lectures was challenging, appreciated being stretched.

- All students agreed that the quality of the lectures was very high
- Students complained that there was significant overlap between lab activities at Southampton and those undertaken at both Liverpool and Sheffield.
- Students were also frustrated with the amount of timetabled "self study" time and felt that more content could have been provided
- Many of the students felt that they had too much free time to "kick their heels".

## **Bath**

- Excellent accommodation.
- All lectures considered to be excellent and of high quality/relevance.
- Style of electrochemical labs (Labs 1), designed as a competition between cohort sub groups, was very popular
- OPV labs in second week were largely criticised by students for being badly organised and not challenging their abilities. Students complained of feeling patronised
- Visit to Bath Abbey + PVSyst exercise was fantastic. Students were very grateful for the interaction with Abbey's curator Charles.

## **Oxford**

- Some accommodation issues.
- In general, module content had a high relevance to most of the cohort.
- The style and nature of assessment was considered by the students to be the most useful compared to other module assessments
- Assessment was peer reviewed but the students felt that additional feedback from organisers would have been useful too.
- Excellent Labs. Students were excited to be doing "real research".
- 
- Full cell fabrication + advanced characterisation gave students a good picture of real challenges in a rapidly expanding area of the field.
- Lectures were less "textbook" and presented recent research. Very useful for the students
- 
- It was generally agreed that the Oxford PV trip was badly organised

## **Loughborough**

- Excellent cohort interaction.
- Students were equally sad and relieved to be finishing their core-level training.
- Accommodation was not up to an acceptable standard. This accommodation will not be booked again.
- Module was considered "well-planned" and interesting by the students.

- Good balance of training content/activity
- Good to have an introduction to Matlab/Labview, however it was felt that the Matlab workshop could have been better presented.
- Excellent labs. Students enjoyed building modules performing and module-scale characterisation + stress testing.
- Many students commented that while the work was not necessarily related to their projects it was good to see things in a wider context.
- Trip to Wyeswold Solar farm was a bit hit.

# **APPENDIX I: Delivery Breakdown**



EPSRC CENTRE FOR DOCTORAL TRAINING  
NEW AND SUSTAINABLE  
PHOTOVOLTAICS

R. Treharne, August 2014

**CORE LEVEL TRAINING:** Year 1 training modules

	per event	per student	notes
Training	£7,000	£500	These values will be flexible according to relative spends at each of the partner institutions
Travel	£1,000	£71	
Sustenance	£4,000	£333	works out as approx £28 per day per student
Accommodation	£9,000	£750	works out as approx £60 per night per student (12 nights)
<b>TOTAL</b>	<b>£21,000</b>	<b>£1,655</b>	

**CATEGORY 1 TRAINING:** Week long International conferences, seminars and workshops

	per event	per student	notes
Training	£3,500	£250	Based on average EUPVSEC and E-MRS conference fees
Travel	£3,500	£250	Based on typical costs of flights to European destinations (booked at least 4 weeks in advance)
Sustenance	£3,000	£250	works out as approx £40 per day per student
Accommodation	£4,000	£286	works out as approx £60 per night per student (5 nights)
<b>TOTAL</b>	<b>£14,000</b>	<b>£1,036</b>	

**CATEGORY 2 TRAINING:** 3 day national conferences, seminars and workshops

	per event	per student	notes
Training	£2,500	£179	Based on student conference fee for PVSAT
Travel	£1,000	£71	Based on typical costs of flights to European destinations (booked at least 4 weeks in advance)
Sustenance	£1,700	£142	works out as approx £40 per day per student
Accommodation	£2,500	£179	works out as approx £60 per night per student
<b>TOTAL</b>	<b>£7,700</b>	<b>£570</b>	

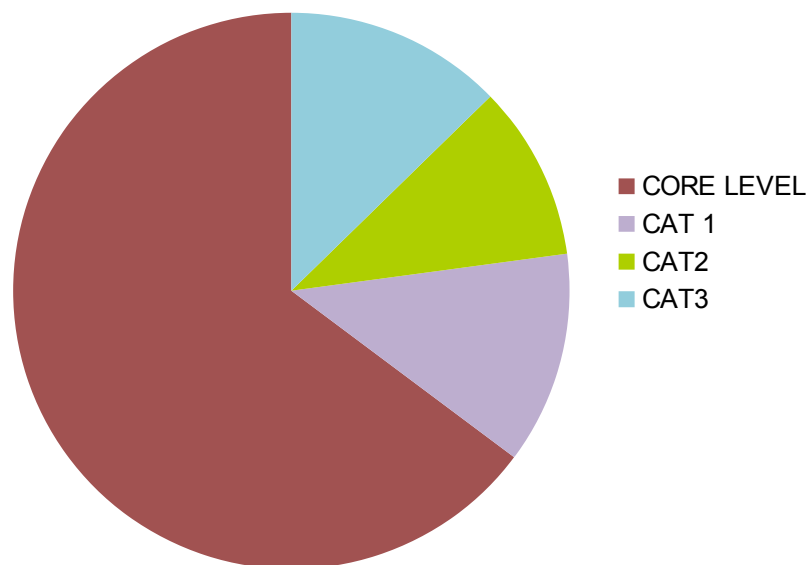
**CATEGORY 3 TRAINING:** 1 day and 2 day general events and showcases

	per event	per student	notes
Training	£1,000	£71	
Travel	£1,000	£71	
Sustenance	£1,120	£93	works out as approx £40 per day per student
Accommodation	£1680	£120	works out as approx £60 per night per student
<b>TOTAL</b>	<b>£4,800</b>	<b>£356</b>	

**DELIVERY COSTS SUMMARY:** total available delivery budget = **£1,177,200**

	Number of events	per cohort	TOTAL (5 cohorts)
CORE LEVEL	7	£147,000	£735,000
CAT 1	2	£28,000	£140,000
CAT2	3	£23,100	£115,500
CAT3	5	£24,000	£120,000
<b>TOTAL</b>	<b>17</b>	<b>£222,100</b>	<b>£1,110,500</b>

### Delivery Costs Summary



#### Notes:

All numbers are estimates based on a maximum cohort size of **14** (i.e. a total number of 70 students over the lifetime of the project). Beyond the first year the cohort size is likely to be less than this which leaves some flexibility within the event breakdowns.

Expenses incurred by academic members are to be incorporated into the event training cost.

All training, travel and sustenance costs will be reclaimable by each partner institution from Liverpool. Accommodation costs will be covered by Liverpool directly. This is to ensure that the quality of accommodation provided for the students is consistent, particularly for the core level training events.