



Meeting Minutes of the Management Committee & Working Groups of COST Action  
 TU1205  
 "Building Integration of Solar Thermal Systems (BISTS)"

16-17 April 2015, Belfast, Northern Ireland, UK

**Place:** Ulster University

Belfast campus

82D23 3. Board Room, York Street, Belfast

**Participants**

Number	Name	Country	16/4/2015	17/4/2015	WG
1	Aeleni Laura	Portugal			WG1
2	Agathocleous Rafaella	Cyprus			WG3
3	Almeida Manuela	Portugal	√	√	WG1
4	Ayompe Lacour Mody	IE			
5	Belis Jan	BE			
6	Blagojebic Mirko	Serbia			
7	Bojic Milorad	Serbia			
8	Bonnet Jean	France			
9	Borg Simon Paul	Malta	√	√	WG3
10	Braganca Luis	Portugal	√	√	
11	Buhagarian Vincent	Malta	√	√	WG1
12	Buonomano Annamaria	Italy	√	√	WG2
13	Cabeza Luisa	Spain			WG3
14	Cappel Christoph	Germany	√	√	WG2
15	Chemisana Daniel	Spain	√	√	WG2
16	Christofi Constantinos	Cyprus	√	√	WG2
17	Chwieduk Dorota	Poland			WG1
18	Coronas Alberto	Spain	√	√	
20	Cristofari Christian	France	√	√	WG1
21	Deb Mondol Jayanta	UK	√	√	WG2
22	Farkas Istvan	Hungary	√	√	
23	Fedrizzi Roberto	Italy	√	√	WG2
24	Florides Georgios	Cyprus	√	√	WG1
25	Ford Andy	UK			WG1
26	Georgiev Aleksandar	Bulgaria	√	√	

27	Ghosh Aritra	Ireland			
28	Goger Thierry	Belgium			
29	Grobman Yasha Jacob	Israel	-	√	WG1
30	Hyde Trevor	UK	√	√	
31	Kalogirou Soteris	Cyprus	√	√	
32	Kennedy David	Ireland	√	√	WG1
33	Keys Donal	Ireland	√	√	
34	Kilik Muhsin	Turkey			
35	Kosic Tatjana	Serbia			WG3
36	Kramer Korbinian	Germany			
37	Krstic Furundzic Aleksandra	Serbia	√	√	WG1
38	Lamnatou Chrysovalanto	Spain	√	√	WG1
39	Leindecker Gerald	Austria			<b>WG3</b>
40	Lopez Lorenzo Jose	Spain			
41	Mateus Ricardo	Portugal	√	√	WG2
42	Maurer Christoph	Denmark	√	√	
43	McCormack Sarah	Ireland	√	√	
44	Miletic Ivan	Serbia			WG1
45	Monteiro Da Silva Sandra	Portugal	√	√	WG3
46	Nikolic Danijela	Serbia	√	√	WG2
47	Norton Brian	Ireland	√	-	
48	Norvaisiene Rosita	Lithuania	√	√	WG1
49	Notton Gilles	France	√	√	WG1
50	O'Hegarty Richard	Ireland	-	√	
51	Ochoa Carlos	Israel			WG3
52	Oleary Tim	Ireland			
53	Palombo Adolfo	Italy	√	√	WG1
54	Platzer Werner	Germany			
55	Popov Rumen	Bulgaria			
56	Radulovic Jasna	Serbia	√	√	WG3
57	Remke Stefan	Spain	√	√	WG3
58	Rusowicz Artur	Poland			WG3
59	Savvides Andreas	Cyprus	√	√	WG1
60	Shiff Galit	Israel			WG1
61	Smyth Mervyn	UK	√	√	WG1
62	Tamasauskas Rokas	Lithuania	√	√	WG2
63	Tripanagnostopoulos Yiannis	Greece	√	√	WG1
64	Tsioutis Charalambos	Cyprus	√	√	WG3
65	Vassiliades Costantinos	Cyprus	√	√	WG1
66	Vittoriosi Alice	Italy			WG1
67	Wansdrunk Rene	Netherland	√	√	WG3
68	Zacharopoulos Aggelos	UK	√	√	WG3

## Day 1: 16<sup>th</sup> April 2015

### Management Committee meeting

#### 1. Welcome to participants

Prof. Kalogirou welcome the participants. Also Mervyn and the Dean of the Faculty of Art, Design and the Building Environment of Ulster University, addressed the meeting.

#### 2. The agenda of the meeting circulated as a hard copy to all members, was adopted.

#### 3. Minutes of the fourth meeting (Freiburg, September 2014)

The minutes of the fourth meeting in Freiburg were approved without any modification.

#### 4. Short presentation of new participants

Prof. Kalogirou introduced the new members participating in the meeting. These are: Farkas Istvan from Hungary, O'Hegarty Richard from Ireland and Grobman Yasha Jacob from Israel (second day only).

#### 5. Report from the COST Office

##### a. News from the COST Office

COST is now transferred completely from FP7 to H2020. This implies changes such as:

- There is no Rapporteur anymore
- No Annual Progress Conference and
- New evaluation method.

There is also a new version of e-COST system that is fully electronic. The OTRR forms will be electronically submitted and handled.

##### b. Status of Action, including participating countries

Prof. Kalogirou reported that 22 COST countries are now participating with Hungary and Romania newly added. There are 30 MC members (+14 substitute members) and 3 new MC members (1 from Hungary and 2 from Romania).

From now on for new countries' participation, MC decision is needed. Therefore in a unanimous voting Romania's participation was accepted.

Additionally two non-COST countries are participating, USA (with James Russell-Appalachian State University) and Canada (with Andreas Athienites-Concordia University).

##### c. Budget status, budget planning and allocation process

The Second year budget is 134,000 Eur. The main expenses are:

- Total for meetings 79,820 Eur of which 42,167 Eur were spent. The remaining for this meeting is 37,653 Eur.

- Training schools: 24,240 Eur. Available 22,162 Eur were spent for the schools and the remaining money were used to print a book after permission from the COST office.
- 5 STSM were planned for 9,000 Eur. So far 3 were completed and one is planned for the end of April. There is not much interest but there is still an opportunity until the end of May.

The Budget planning for the third year is as follows:

- The Total budget was reduced to 122,000 Eur
- Two meetings planed for 86,810 Eur
- The Mid-Action Symposium will be held together with the first meeting of the third year.
- A Training School for 10,200 Eur, will be held together with the second meeting of the fourth year
- 4 STSM are planned for the third year for 6,000 Eur

d. Meetings of the Second year

The following meetings were held:

- SG meeting in Paris (July 2014)
- MC & WG First meeting in Freiburg (September 2014)
- SG meeting in Dublin (January 2015)
- MC & WG Second meeting in Belfast (April 2015). This was planned to be held in Malta but because of a high financial cost due to the tourist season it was postponed for another occasion.

e. Critical managerial issues

The following points were raised:

- It is very important to pay more attention to emails received concerning deadlines.
- Emphasis on managerial issues concerning payments.
- Inform Prof. Kalogirou when there is a delay in reimbursement payment
- Follow reimbursement procedures
- All payments are carried out simultaneously. The claims should be completed in one month's time after the event.
- The attendance list must be signed on both days by the participants
- Reimbursement claims are now sent electronically through the e-cost system.
- Mr. Charalambos Tsioutis and Prof. Kalogirou can answer questions concerning details.
- Inform Prof. Kalogirou for any projects submitted/organised based on the Action such as New PhDs, local funded research, FP7/H2020 proposals

even if they were not successful, etc. This is very important for the progress of the Action.

f. Training School

The First training school took place between 1-3/9 in Freiburg before the MC & WG meeting. 30 positions were available and 29 students (mostly PhD) participated. 12 trainers gave lectures. The Evaluation was positive.

The Second training school is planned for the fourth meeting (February 2016)

g. Progress report of working groups

The progress is as follows:

**WG1. Development and characterisation of new BISTS**

- Task 1.1 Review of the state of the art - **completed**
- Task 1.2 Development of new BISTS solutions (Year 3 & 4)
- Task 1.3 Characterisation of BISTS developed in Task 1.2 (Y 3 & 4)
- D.1.1. Review of current STS and identification of problems associate with their building integration. This review will also be submitted as a joint partner publication in a peer reviewed journal (Month 12) - **completed**
- D.1.2. Annual STSM on BISTS development and characterisation for PhD students and Early Stage Researchers (Month 6, 18, 30, 42) **ON-GOING**
- D.1.3. Annual Training School for dissemination of expertise on BISTS development and characterisation techniques and new architectural solutions to PhD students and Early stage researchers (Month 18, 30, 42) **ON-GOING**
- D 1.4. Report on the evaluation technologies available for BISTS characterisation (Month 24) – **NOT completed – on the way.**

**WG2. Modelling and Simulation**

- Task 2.1 Development of new mathematical and numerical models for BISTS (Years 3 & 4)
- Task 2.2 Validation and implementation of codes developed in 2.1
- D 2.1. Review of current STS modelling techniques. This review will also be submitted as a joint partner publication in a peer reviewed journal (Month 12) - **completed**
- D.2.2. Annual STSM for PhD students and Early Stage Researchers on theoretical modelling and numerical simulation of thermal behaviour of BISTS (Month 6, 18, 30, 42)
- D.2.3. Annual Training School for dissemination of expertise to PhD students and Early Stage Researchers (Month 18, 30, 42) **ON-GOING**
- D 2.4. Report on the validation of developed codes, both thermal and optical (Month 30)

- D 2.5. Report on the new models developed during the project and potential for adaptation for RES (**Month 42**).
- D.2.6. Report on the development of new models for innovative integrated STS applications (**Month 46**)

### **WG3 Investigation of new applications for innovative BISTS**

- Task 3.1 Design of innovative BISTS designs
- Task 3.2 Fabrication of BISTS prototypes
- Task 3.3 Characterisation of novel BISTS indoors and outdoors to assess the actual performance in real conditions
- D.3.1. Review of current STS and the suitability of integration onto building structures for domestic, commercial and industrial buildings (Month 12). - **completed**
- D.3.2. Annual STSM for PhD students and Early-stage researchers on design, fabrication and characterisation of innovative integrated STS/ RES (Month 6, 18, 30, 42) **ON-GOING**
- D.3.3. Annual Training School to disseminate expertise to PhD students and Early Stage Researchers (Month 18, 30, 42). **ON-GOING**
- D.3.4. Report on fabricated integrated STS prototypes optimised for increased efficiency and low cost. Full building services integration (e.g. into existing heating, cooling, hot water) or stand-alone operation but integral to the structure. This will depend on the extent of own research funding allows (**Month 36**).
- D.3.5. Report on the performance of new integrated STS/RES prototypes: A country performance comparison with geographic diversity (South, Central and North Europe), (**Month 42**).
- D.3.6. Handbook for architects and building services engineers on the developed BISTS solutions for the design market ready products. (**Month 46**)

#### **h. Handbook**

WG 3 will coordinate the work for the HB. This will include new prefabricated products, a variety of mounting surfaces (vertical, sloped, horizontal) and the use of new materials, like PCM. The handbook will also include the development of BISTS through novel modelling techniques, fabrication and assembly of BISTS prototypes specifically tailored to building element integration, performance measurement of novel BISTS and the suggestion of standardised procedures and the determination of a range of applications for BISTS. Discussion of the contents must start in WGs.

#### **i. Short Term Scientific Missions (STSM)**

These may have a duration of 5 days to 3 months (max. 6 month for ESR) with a max overall cost of 2500 EUR for an STSM of up to 3

months and max 3500 EUR for over 3 months (ESR). The calculation is based on a Daily allowance of 60-90 EUR and 300 EUR for travelling.

5 STSM are planned for the second year which will be used almost exclusively to prepare Action deliverables. The Total Budget is 9,000 EUR (1800/stsm). Any applications to be sent to the STSM manager first. Then the application should proceed through the e-cost system. So far 3 were carried out and 1 is planned for the end of April.

j. Publications, dissemination and outreach activities

The following points were highlighted:

- The First publications were due for month 12 (April 2014).
- The WG1 deliverable was very late.
- All must contribute unless they may not be invited in the next meetings.
- A book was published that is composed of the three deliverables. The electronic copy of the book will be made available in pdf form in the webpage of the Action soon.
- The next major event is the Action Symposium that will be part of the first meeting of third year (everybody participate)
- Unfortunately only ten papers were submitted and some of them were out of scope (not on BISTS).

#### **Working Group 4: Dissemination Activities**

1. Website (Soteris)

- The COST official web page is:  
[http://http://www.cost.eu/domains\\_actions/tud/Actions/TU1205](http://http://www.cost.eu/domains_actions/tud/Actions/TU1205)
- The Action web page is:  
<http://www.tu1205-bists.eu/> (Password: cost 1234!)
- new members should provide a photo and the logo of the institution
- Any documents should be sent to Mr. Costas Christofi. Email:  
c.christofi@cut.ac.cy

2. Status of first deliverables (Soteris+David)

- First year deliverables are now completed.
- A Book was published using the material from the 3 deliverables. Each participant received a copy. More copies are available.
- Deliverable of D 1.4.- Report on the evaluation technologies available for BISTS characterisation (Month 24) is not completed. The report is nearly ready and the finalization is expected in 5 weeks.

3. Planning of mid Action Symposium (2015) (Soteris)
  - This will be combined with Euro-ELECS 2015 (21-23/7)
  - The deadline for abstracts was on 30/9/2014
  - Unfortunately the interest was low. New papers will be accepted if they are presented in a month's time → Up to 22 May!!
  - It was decided to be organized on Tuesday 21/7 in the afternoon.
  - Those participating in the conference will pay by OWN MONEY the conference registration (250 Eur).
  - Symposium entrance is free for Action members and for Conference participants.
4. STSM's 2015 (Soteris+Gilles)
  - There is provision for 4 STSMs to be completed before the end of April 2016
  - It is desirable to be combined with work on deliverables.
  - Applications to be forwarded to STSM manager (Gilles)
5. Publications, dissemination and outreach activities (Soteris)  
For the next deliverables of WG3 (D 2.4. on month 30 and D.3.4. on month 36) anyone can contribute and can offer material to be included.

### Presentation of projects

**Project 1**-Solar Thermal Façade System and **Project 5**- Evacuated Tube Collector integration presented by Prof. Kalogirou

**Project 2** - Hybrid PV/T/solar Thermal façade module presented by Mervyn Smyth

**Project 3** - Solar Plenum presented by Brian Norton

**Project 4** - Concentrating PV/T Glazing presented by Aggelos Zacharopoulos

**Note:** Grobman Yasha Jacob, presented more details of Project 5- Evacuated Tube Collector integration (second day).

**Day 2: 17<sup>th</sup> April 2015**

### Second Management Committee meeting

#### 1. Action planning

- Budget status, budget planning and allocation process
  - The New Action budget for 2015 is 122,000 Eur - Reduced from previous years.
  - Five STSM in total (four carried out) with a budget of 9,000 EUR (up to 31/5/2015). Need to show more interest to send and accept students for STSM.



2. Location and date of next meeting
  - The next meeting will take place in the University of Minho at Guimaraes, Portugal on 20 and 21/7/2015 (Monday and Tuesday)
3. Meetings, symposium and next Training School.

Provisional planning for meeting #7

- This meeting has to be combined with the second training school
- Location: Central Europe (low cost transportation for students)
- Possible venue: Warsaw, Poland
- Possible time: Mid February 2016.

**14.30-17.30 Visit to CST laboratories, Ulster University - Jordanstown  
Kingspan industry presentation**

The Cost participants visited the CST laboratories, Ulster University – Jordanstown. At first a presentation about the performance and evaluation of the Back-pass non-perforated unglazed solar air collector was given by the representative of Kingspan Energy, Miguel Paya-Marin. This was followed by a discussion with Industry representatives and closed with a tour in the Laboratories.

## WG minutes

### Minutes of WG1

Agenda for all WGs:

1. Welcome to participants
2. Adoption of the agenda
3. Progress of deliverables
4. Discuss 5 projects presented
5. Distribution of tasks
6. Promotion of gender balance and of Early Stage Researchers (ESR)
7. Time-table for future work

Brian Norton welcome the participants. The meeting adopted the agenda and discussed the progress of the deliverables. The technical characterization of **D.1.4** is ready but characterization of architectural criteria needs to be covered. Andreas Savvides undertook to establish architectural criteria on which to evaluate BISTS. Norton presented a table with various criteria and asked for improvement.

Discussion about the **Handbook** (HB) followed. Gilles proposed to include a chapter on orientation and climate that he will prepare.

Legal issues, training environment, skills etc should also be included in a heading because of their importance and variety in different countries.

It was also decided that the general HB breakdown will follow the form decided in the previous meeting and in every topic it will make reference to the five projects presented to the meeting. By giving a general introduction at the beginning and by closely analysing the various topics in respect of the five projects, general conclusions can be extracted at the end of the book.

The participants then express their willingness to contribute to the development of the 5 projects as follows:

Project 1 - Solar Thermal Façade System, Soteris Kalogirou;  
Florides, Christofi, Savvides, Vassiliades, Palombo, Krstic Furundzic, Notton,  
Sarah, Cristofari, Norvaisiene, Almeida Manuella

Project 2 - Hybrid PV/T/solar Thermal façade module by Mervyn Smyth"  
Lamnatou, Palombo, Krstic Furundzic, Notton, Sarah, Cristofari,  
Norvaisiene Almeida Manuella, Yiannis.

Project 3 - Solar Plenum, Brian Norton, Yiannis.

Project 4 - Concentrating PV/T Glazing, Aggelos Zacharopoulos, Lamnatou, Florides,  
University of Minho, Savvides, Vassiliades, Georgiev.

The above persons will be contacted by the Project leaders who will provide a list of requirements and ask them to help in any way possible. The persons should respond with suggestions.

### **Minutes of WG2**

#### **1. Agenda**

- 1- Welcome to participants
- 2- Objectives, deliverables and working programme
- 3- Distribution of tasks
- 4- Timetable of work

#### **2. Participants**

Christoph Maurer (Germany)  
Christoph Cappel (Germany)  
Danijela Nikolic(Ser)  
Annamaria Buonomano (Italy)  
Roberto Fedrizzi (Eurac, Bolzano)  
Rokas (Lithuan)  
Daniel Chemisana (Spain)  
Ricardo Mateus (Port)  
Alberto Coronas (Spain)

#### **3. Deliverables and milestones**

- Deliverables include:
  - D 2.1. Review of current STS modelling techniques. This review will also be submitted as a joint partner publication in a peer reviewed journal (Month 12)

- D.2.2. Annual STSM for PhD students and Early Stage Researchers on theoretical modelling and numerical simulation of thermal behaviour of BISTS (Month 6, 18, 30, 42)
- D.2.3. Annual Training School for dissemination of expertise to PhD students and Early Stage Researchers (Month 18, 30, 42). This will include topics on theoretical modelling and numerical simulation of thermal behaviour of BISTS.
- D 2.4. Report on the validation of developed codes, both thermal and optical (Month 30).
- D 2.5. Report on the new models developed during the project and potential for adaptation for RES (Month 42).
- D.2.6. Report on the development of new models for innovative integrated STS applications (Month 46).
- Milestones:
  - 2.1 New validated mathematical and numerical models to predict the BISTS performance
  - 2.2 New validated models to optimize BISTS in innovative RES applications

#### 4. Minutes

The next deliverables 2.5 and 5.6 will be focused on the 5 projects. In this regard:

##### Project #1 :

- Cesare (U. Naples) is conducting a simulation in Matlab.
- About the same project, comparative analysis will be performed based on Trnsys (Fortran and C).
- The comparative simulation work could be conducted by a STSM student.
- In the next meeting the strategy will be fixed.

##### Project #2:

- Maria (U. Naples) is conducting measurements of the system.
- In the next meeting the results will be analyzed and the simulation strategy will be defined.

##### Project #3:

- WG2 is aware of the experimental results of the system in order to discuss modeling and simulation issues (Next meeting).

##### Project #4:

- A PhD thesis is finalized about the system, the thesis includes CFD and optical simulations. The manuscript will be studied to further discuss it in the next meeting.

##### Project #5:

- As the system is operating under real conditions and simulations are already performed, the WG2 asks for information to the responsible from Israel.

In parallel, LCA simulations of the effect of BIST on buildings are in process between U. Minho and U. Lleida.

### **Minutes of the WG3 meeting**

List of participants present at meeting:

1. Yassa - Israel
2. Charalambos Tsioutis – Cyprus
3. Sarah McCormick – Ireland
4. Simon Borg – Malta
5. Rene Wansdronk – Netherland
6. Sandra Monteiro Silva – Portugal
7. Jasna Radulovic – Serbia
8. Stefan Remke – Spain
9. Trevor Hyde – UK
10. Jayanta Deb Mondol – WG deputy leader, UK
11. Aggelos Zacharopoulos – WG Leader, UK

Absent:

1. Manolis Souliotis – Greece
2. Gerald Leindecker – Austria
3. Tim O’Leary – Ireland
4. Carlos Ochoa – Israel
5. Rafaela Agathokleous – Cyprus
6. Artur Rusowicz - Poland
7. Tatjana Kosic - Serbia
8. Luisa F Cabeza - Spain

#### 6. Welcome

- The chair welcomed the meeting participants and the new WG member from Israel - Yassa

#### 7. Adoption of the agenda

The meeting agenda proposed by the leader was adopted by the group members with no changes.

8. Aggelos enquired about paper submission from the D3.1
- Jasna has 3 conference papers submitted and a further one to be submitted for the symposium
  - Stefan can also prepare a paper as he has monitoring data from a live BISTS. He will try and set up a STSM to assist him with the paper
9. Yassa provided an overview of the Porter project in Israel. The project is a BISTS and live monitoring is taking place. Project outputs will be part of the Action deliverables.
10. Deliverable D3.4
- To be able to produce the report, the WG will need to monitor the BISTS development projects within the Action.
  - WG3 will allocate 2 persons (min) to each one of the Action projects. The two persons will be responsible for collecting and collating the information relevant to the project that will be included in the deliverable.
  - The group discussed the allocation and also to which Action projects the WG members would like to contribute. The following table was compiled:

Project	Lead	Report	Contribute	Deadline
Porter building	Yassa	Sandra	Sandra	Oct-15
		Carlos	Carlos	
		Rene	Rene	
			Simon	

<b>Hy-PVT</b>	Mervyn	Jasna	Jasna	Dec-15
			Stefan	
			Sarah	

<b>TCI-STF</b>	Soteris	Charalambos	Charalambos	Dec-15
		Rafaella	Rafaella	
			Sarah's PhD	

<b>IACPC-Air</b>	Brian	Sarah	Sarah	Feb-16
		Trevor	Trevor	

<b>Façade thermal</b>	Stefan	Jayanta	STSM	Oct-15
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<b>CoPVTG</b>	Aggelos	Jayanta	Trevor	Dec-15
		Simon	Jayanta	
			Simon	

- **Lead:** the scientific lead of the technology being developed
  - **Report:** WG3 participants responsible for reporting on the project for D3.4 and D3.5
  - **Contribute:** WG3 participants that want to contribute to the work in the project.
  - **Deadline:** The estimated date for compiling the report on the individual project.
- The WG3 that were not present in the meeting should also select one of the projects to report on and if possible, contribute to it.
  - The following structure was proposed for the deliverable:
    - Introduction – Rational
    - Novelty of the concept and applications
    - Design/Description of system including architectural integration options

- Fabrication methodology
- Limitations-Recommendations
- Material costs (labour costs if possible)
- Integration approaches to the building's services
- Conclusions

#### 11. Deliverable D3.5

A similar methodology to D3.4 will be followed for the preparation of the deliverable.

#### 12. The WG will propose that project based meetings should take place in the next meeting in Portugal (July 2015):

- Day 1 sessions to be project focused
  - Project leads and teams discussing planning and status of projects tasks
- Day 2 sessions to be WG focused
  - WGs meeting as normal to discuss their deliverables/tasks

#### 13. Dr Jayanta Deb Mondol (UK) will be the WG deputy leader going forward.