

## Final technical report

### Building Energy Modelling and Monitoring workshop

The Faculty of Architectural Engineering Tripoli branch has organised a scientific workshop with title 'Building Energy Modelling and Monitoring'. The workshop lasted for three days 29<sup>th</sup>, 30<sup>th</sup> November and 1<sup>st</sup> of December, eight hours per day (total 24 hours).

The objective of this workshop was to furnish guidance on the appropriate application of **Building Performance Simulation (BPS)**, to promote good practice and to offer reference material to support practicing environmental engineers and architects. The workshop has covered the basics of using simulation tools with an emphasis on application and case studies. The workshop also emphasised the importance of simulation validation, in particular building performance monitoring. The workshop included an experiential half-day intricacies and joys of evaluating environmental performance aspects of buildings. Using cutting-edge microprocessor based data loggers and handheld instruments on site, participants have understood about how (and how well) buildings perform.

#### Participants:

There were 23 participants from various educational and professional backgrounds, see Chart (1).

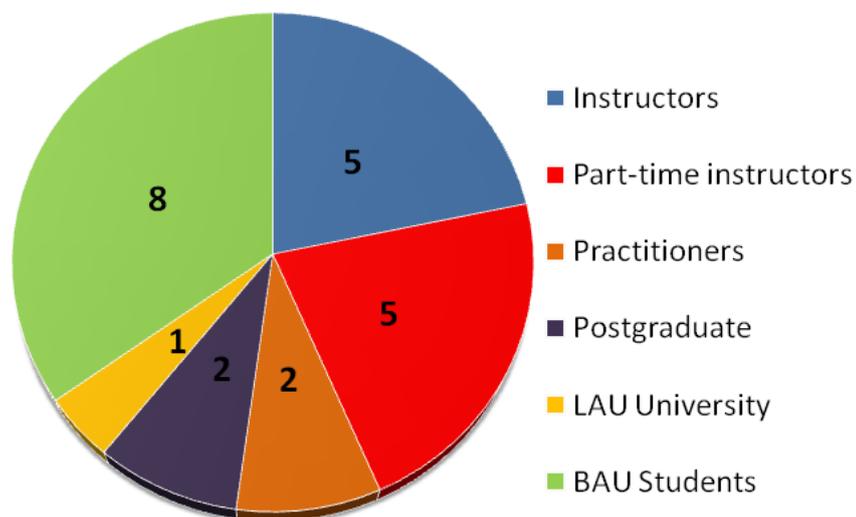


Chart 1 shows number and distribution of participants.

#### Activities and preparations for the three-day workshop:

The workshop was divided into three main activities in each day: lectures, applications and simulation, in addition to two coffee breaks and lunchtime as demonstrated in the following table (1).

## Day 1: Setting up the Simulation and Monitoring Basics

Time	Activities
9:00	Overview on Building Energy Modelling & Monitoring (Input & Output Validation)
10:30	<b>Break</b> Understanding Building Performance Modelling
12:30	<b>Lunch Break</b>
13:15	Geometry and Zoning Importing 2-D floor plans Setting adjacency component blocks (underground and adiabatic buildings)
15:30	<b>Break</b> Model options

## Day 2: Simulation and Monitoring Basics continued

Time	Activities
9:00	Constructions, Infiltration model data
10:30	<b>Break</b> Templates
12:30	<b>Lunch Break</b>
13:15	Heating Design, Cooling Design, Simulation Timing -Schedules, Profiles, Holidays Glazing and Solar Shading
15:30	<b>Break</b> Lighting and daylight control Scheduled & Calculated Natural Ventilation + Infiltration

## Day 3: Simulation and Monitoring Basics continued

Time	Activities
9:00	HVAC (Simple and Detailed)
10:30	<b>Break</b> Monitoring Output Post Processing
12:30	<b>Lunch Break</b>
13:15	Comparing results Radiance Daylight Modelling Data & Calculation Outputs Embodied Energy, Carbon Emissions
15:30	<b>Break</b> Output Post Processing Parametric Analysis & Optimisation

Table 1 highlights the workshop schedule along the three days

All the facilities were prepared and provided on the third floor of the Faculty of Architectural Engineering, building (F). The preparation included installing Wi-Fi internet, installing the trial software on 30 computers at our computer lab, and printing labels, lecture notes and collecting the workshop data on CDs. On the first day (Saturday 29<sup>th</sup>), the participants have registered and received the workshop bag (from 8:30 to 9:00), which included all the printed data in addition to the workshop CD, see figure (1). There were some technical problems in installing the software; however, the organising committee has overcome it.



Figure 1 shows the preparations and the workshop bag



Figure 2 initial meeting to introduce the workshop objective, the instructor and the workshop schedule of the three days. This meeting was held at the Director of the faculty office.



Figure 3 initial meeting to introduce the workshop objective, the instructor (Dr. Shadi Attia) and the workshop schedule of the three days. This meeting was held at the Director of the faculty office.



Figure 4 starting the lectures and our first simulation with the instructor Dr. Shadi Attia.



Figure 5 collective photo of all the participants (Day 2)



Figure 6 parts of the free discussions with our instructor at the coffee break.



Figure 7 lunch break

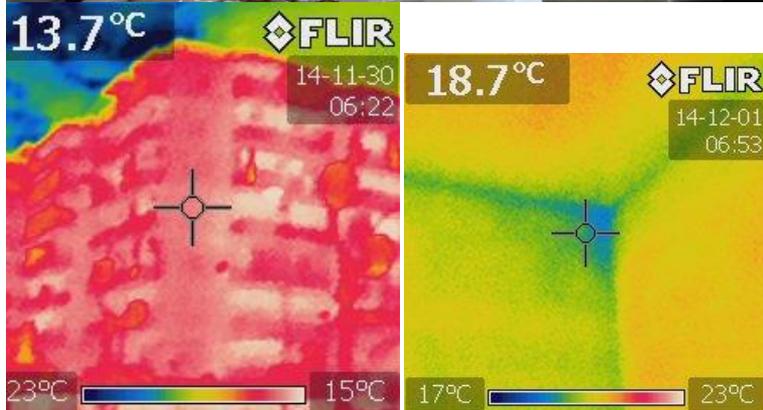


Figure 8 using the thermal camera tool (day 3)

At the end of the third day, the instructor has distributed the workshop certificate to each participant, see figure 9.



Figure 9 shows number of participants receiving their certificate from the instructor Dr. Shadi Attia at the end of the third day of the workshop.

Before leaving the lecture hall at the last day, the organising committee members have distributed a questionnaire to all the participants to know their opinion about the workshop content, facilities provided, the instructor performance and finally their interest, whether to participate in further events (workshops) and to know their suggestions (workshop topics), see the following page about the questionnaire template.

## Building Energy Modelling Workshop (29, 30 November and 1 December 2014)

We would like to thank you for joining us in the Building energy modelling workshop that was organised by the Faculty of Architectural Engineering, Tripoli campus branch, Beirut Arab University at 29-30 November to 1 December 2014. It is highly appreciated if you kindly fill out the attached questionnaire that will help us to improve and enhance the next coming events.

1. Name (optional):
2. Gender:                      Male                      Female
3. Participant affiliation: University  
                    Undergraduate                      Postgraduate                      Practitioner
4. The scientific content of the workshop has met your expectation  
a. Strongly agree                      b. Agree                      c. Neutral                      d. disagree                      e. Strongly disagree
5. The duration of the workshop (3 days) was appropriate  
a. Strongly agree                      b. Agree                      c. Neutral                      d. disagree                      e. Strongly disagree
6. The instructor has covered all the aspects of the workshop topics  
a. Strongly agree                      b. Agree                      c. Neutral                      d. disagree                      e. Strongly disagree
7. The instructor has used the workshop time effectively  
a. Strongly agree                      b. Agree                      c. Neutral                      d. disagree                      e. Strongly disagree
8. The facilities provided for this workshop were adequate  
a. Strongly agree                      b. Agree                      c. Neutral                      d. disagree                      e. Strongly disagree
9. Your overall satisfaction of this workshop  
a. Strongly satisfied                      b. satisfied                      c. Neutral                      d. dissatisfied                      e. Strongly dissatisfied

If the faculty of Architectural Engineering at BAU will organize other scientific workshops, would you consider to participate?  
**a. Participate                      b. Maybe                      c. Not interested**

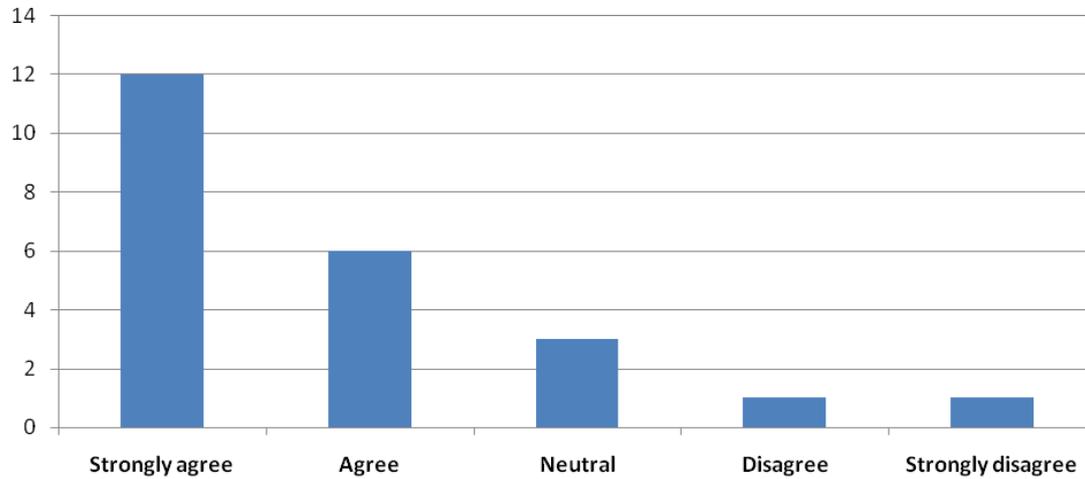
If you are interested to participate, would you kindly rate the following topics according to your interests:

- . Architecture parametric design
- . Spatial configuration analysis (Space syntax)
- . 3D virtual simulation of historic buildings/sites
- . GIS (spatial analysis)
- . Light design simulation
- . Passive design using simulation tools
- . Leed accredited professional
- . Building energy modelling
- . Building energy modelling and monitoring
- . Post occupancy evaluation
- . Other fields:  
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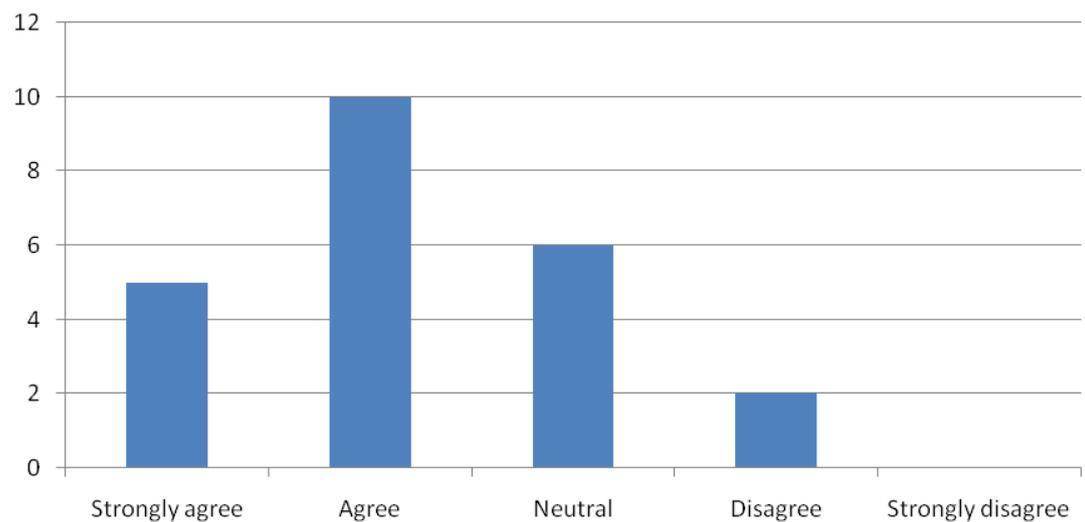
Thank you

The results of the questionnaire reveal that the participants were satisfied and willing to participate in further events. The results were as follows:

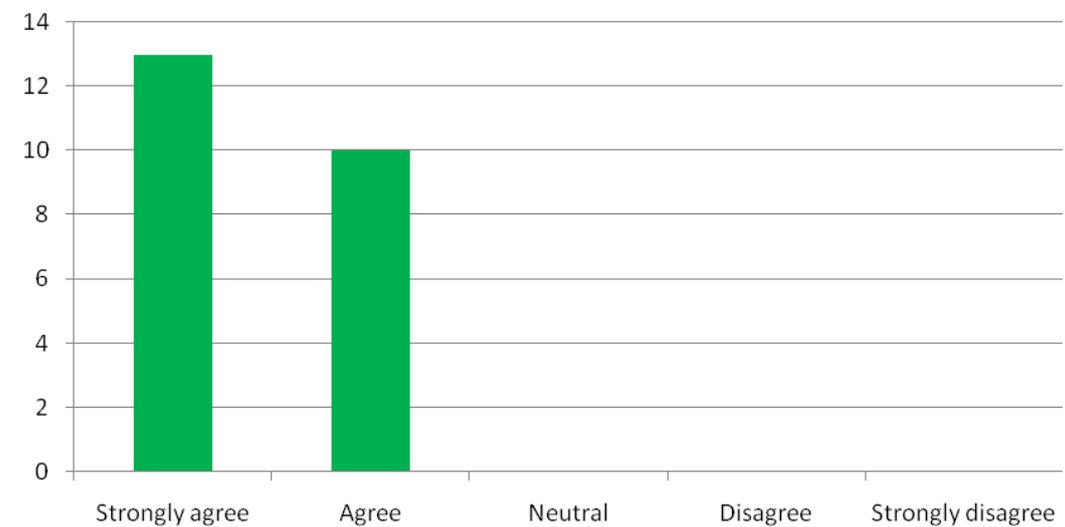
**Question no. 4:** The scientific content of the workshop has met your expectation



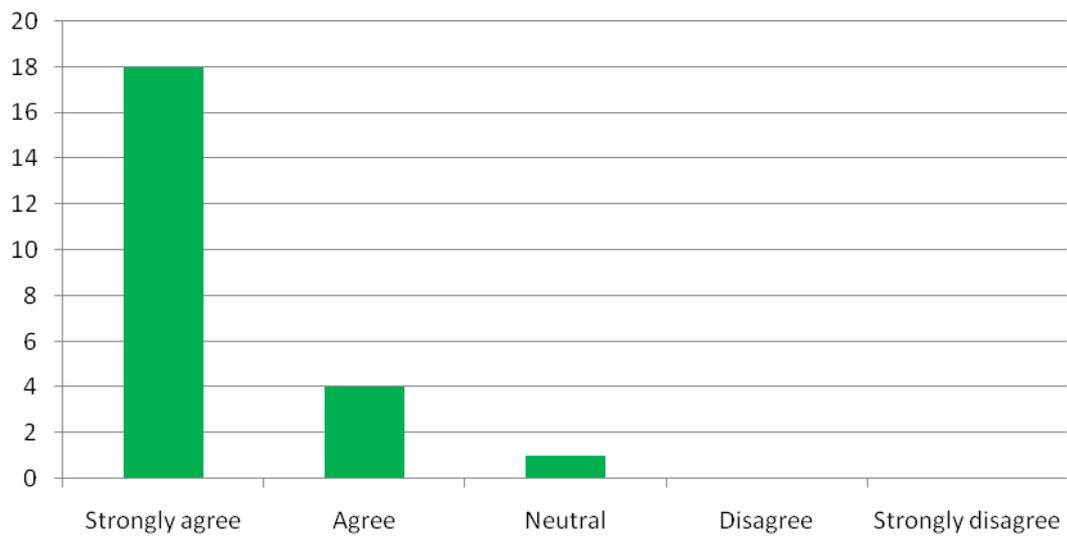
**Question no. 5:** The duration of the workshop (3 days) was appropriate



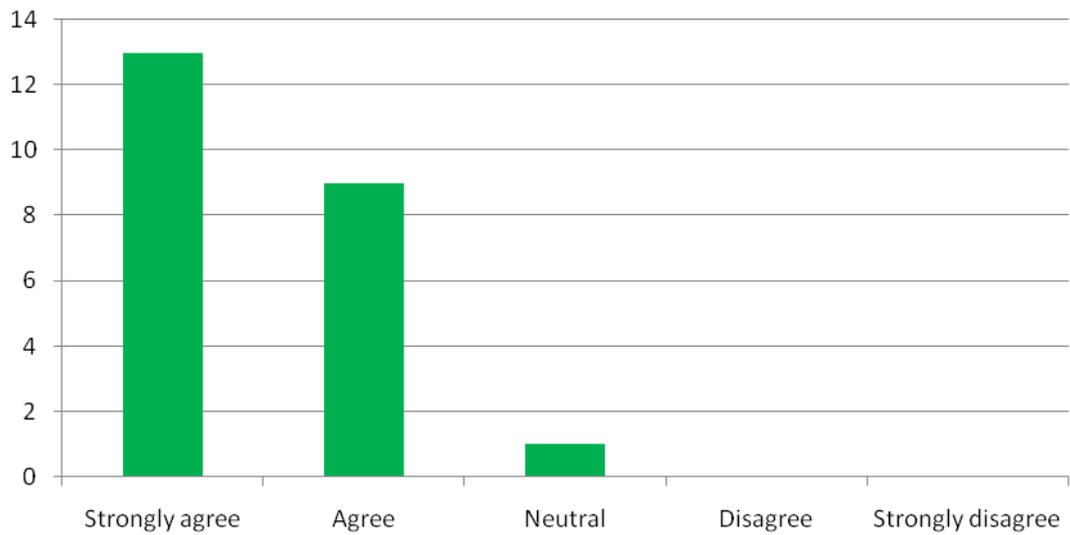
**Question no. 6:** The instructor has covered all the aspects of the workshop topics



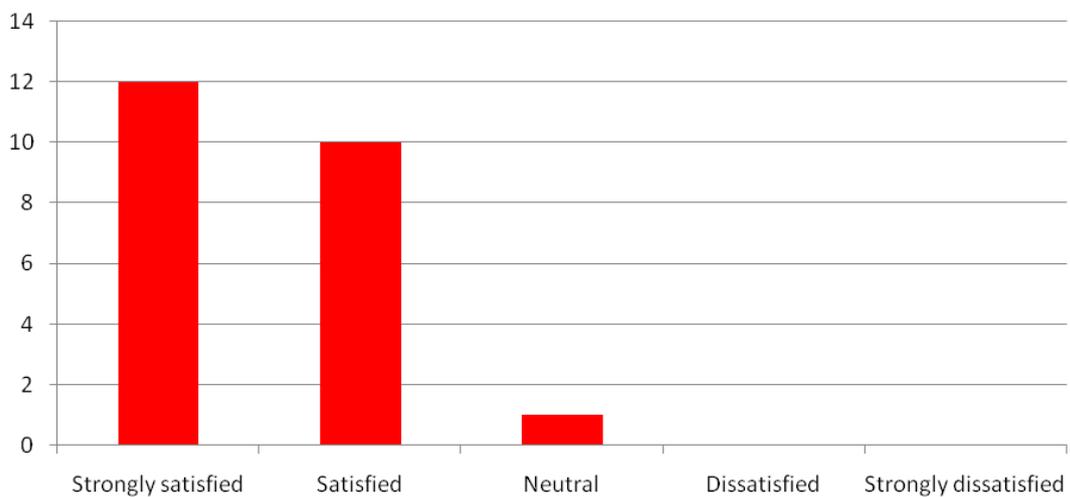
**Question no. 7:** The instructor has used the workshop time effectively



**Question no. 8:** The facilities provided for this workshop were adequate



**Question no. 9:** Your overall satisfaction of this workshop



The participants have chosen the following topics as suggested new workshops:

- Leed accredited professional
- Architecture parametric design
- Passive design using simulation tools
- Post occupancy evaluation



The organising committee would like to thank Dr. Wassim Itani (Director of Center for continuing and professional education) for his tremendous effort and support for this workshop. Also, special thanks to Mr. Ahmed Sankari for his continues assistance and unlimited efforts, in addition, we appreciate all the help provided from the student affairs in our Tripoli branch Ms. Rola Homsy and her team.

Finally, this workshop would not have been done without the support of the Vice President for Tripoli Branch Affairs Prof. Khaled Baghdady and the President of Beirut Arab University Prof. Amr El-Adawi.

### **Building Energy Modelling and Monitoring workshop**

**Organising committee:**

**Dr. Nabil Mohareb;**

**Dr. Kareem Galal;**

**Eng. Yathreb Sabsaby**

Faculty of Architectural Engineering  
Tripoli Campus  
Beirut Arab University  
3<sup>rd</sup> of December 2014