Communications Pte Ltd

February 6th, 2009

SolaCoat Project Trial Result Report

"Take The Heat Out Of Our School"

Location – South View Primary School
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"Take The Heat Out Of Our School"

1.0 Trial Objectives

I. To determine the implications of SolaCoat on energy efficiency and potential cost saving.
II. To assess the potential improvement to the environment and comfort level for all student & staff.

1.1 Involved Parties

- MI Communications Pte Ltd (Sole agent for SolaCoat in Singapore)
- ZPT Technology Pte Ltd (Third Party Energy Auditor)
- GE Renovation and General Work (BCA/HDB approval applicator)

2.0 Selected Trial Areas

After various site surveys and discussions with school OM (Operation Manager) and Staff, co-study trial were carried out. The 2 areas selected which are deem most appropriates are ;

1) Staff room – Concrete Roof area - approximately 360m2

2) Class Room 6.8 – Metal Roof area - approximately 100m2

2.1 Test Schedules

Jan 5th to Jan 10th — Pre-application data collection – from 7am to 7pm daily
Jan 19th to Jan 24th — Post-application data collection – from 7am to 7pm daily

3.0 Methodology

To achieve the objectives of this trial, combination of test approaches were carried out as below;

a. Location 1 (Staff Room) – To compare the Pre & Post SolaCoat application data to draw conclusion and observation. Data collected from the following samplings ;
   i. The energy consumption (in KWH) of the air-con units recorded.
   ii. The roof temperature measured and recorded.
   iii. Ambient temperature around the roof area monitored and recorded

b. Location 2 & 3 (Class Rooms) – To compare the data collected from the SolaCoat treated classroom (6.8) and the adjacent unpainted original classroom (6.9). Data collected from the following samplings ;
   i. The roof temperatures measured and recorded
   ii. Ambient temperatures beneath the roof and between the false ceilings tracked.
   iii. Ambient temperature around the roof area monitored and recorded

4.0 Equipments used

- Fluke Model 435 Power Analyzer
- Fluke Model 61 Digital Thermometer
- Sirius Technology Temperature Loggers
- Outdoor Mercury Thermometer

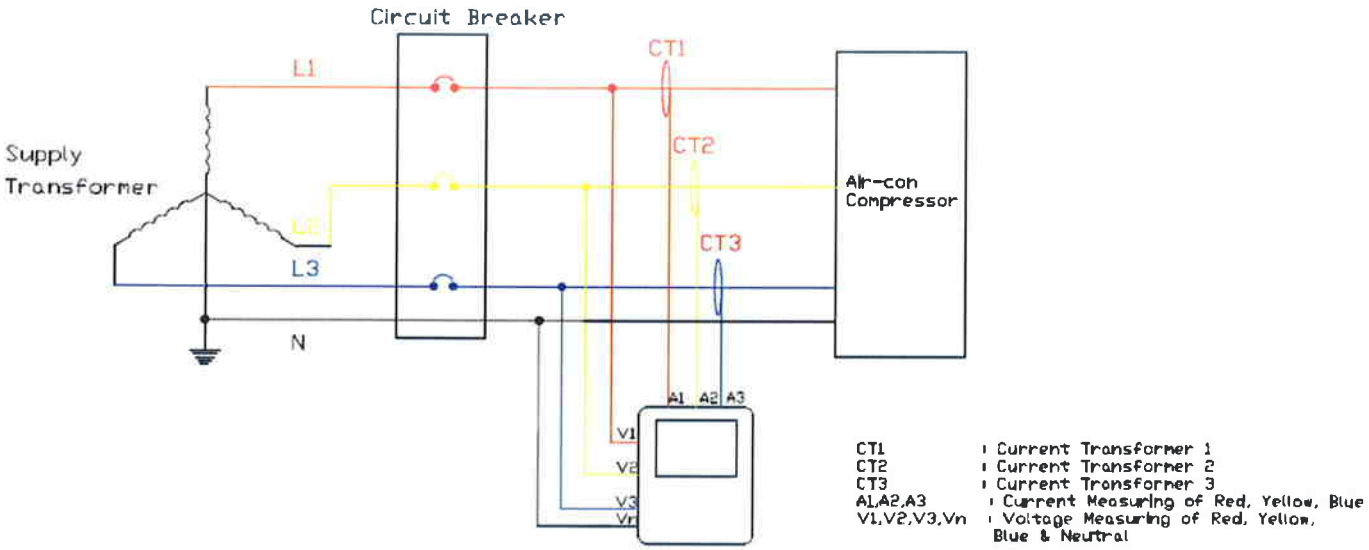
4.1 Description of Test Setups

a) Location 1 (Staff Room)

i. Electrical Energy tracking

The Fluke 435 power analyzer was setup on the staff room air-con compressor in DB1 with 3 phase to Neutral (415V/240 V) for the Star connected 4 Wire System. (Refer to connection diagram)

Total power drawn (in KWH) per day at the circuit breaker of the air-con compressor (Single compressor at DB 1) was collected over a period of 5 days before SolaCoat application and 5 days after SolaCoat application.



Fluke 435 Power Analyser

ii. Roof Surface Temperature recording.

The Fluke Model 61 digital thermometer is used to record the surface temperature of the roof from pre-determined consistent location at a regular interval of 12pm and 4pm daily throughout the entire Pre & Post period. Recording carried out by the school OM (Operation Manager)

iii. Positioned outdoor mercury thermometer near roof area

An outdoor mercury thermometer was placed near the roof area and daily ambience temperature was recorded by the school OM (Operation Manager) at interval of 12 noon and 4pm daily.

b) Location 2 & 3 - Class Room 6.8 (with SolaCoat) and 6.9 (original metal roof)

i. Roof Surface Temperature recording

The Fluke Model 61 digital thermometer is used to record the surface temperature of both roofs of Class6.8 & 6.9 from a pre-determined consistent location at a regular interval of 12pm and 4pm daily. Measurement and recording carried out by the school OM (Operation Manager)

ii. Logging of temperature within roof insulation

Sirius temperature logger were placed within the confine beneath the roof surface and the false ceiling of both class room 6.8 and 6.9 to measure the temperature within during the entire post trial period. The loggers were programmed to log the temperature within on an hourly interval.

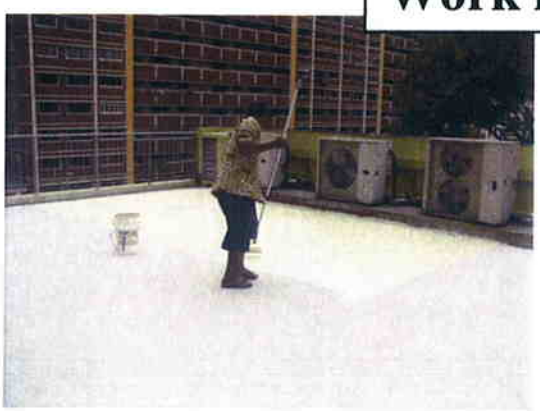
iii. Positioned outdoor mercury thermometer near roof area

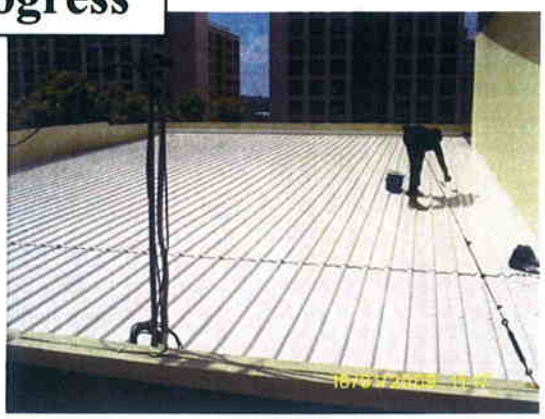
An outdoor mercury outdoor thermometer was placed near the roof area and daily ambience temperature was recorded by the school OM (Operation Manager) at interval of 12 noon and 4pm daily.

5.0 Preparation

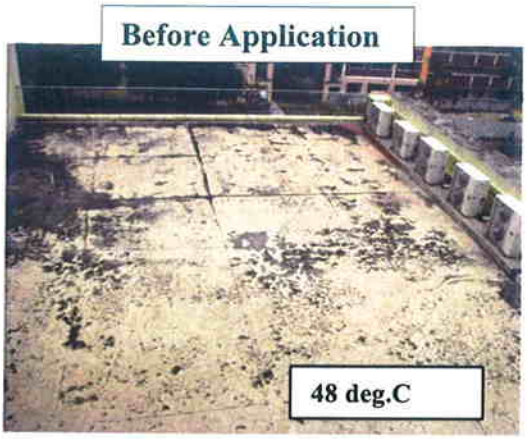
Work in progress

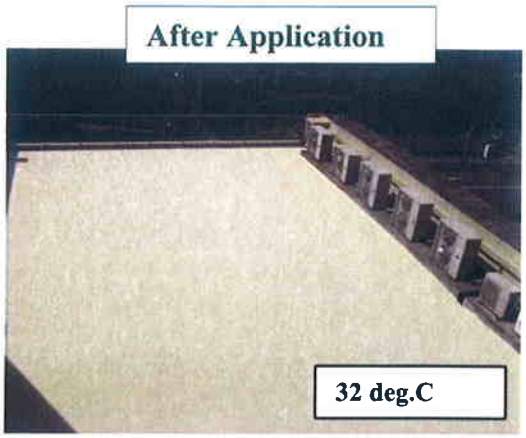
Work in progress

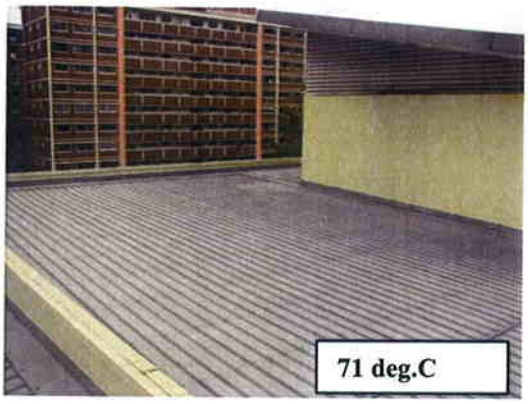




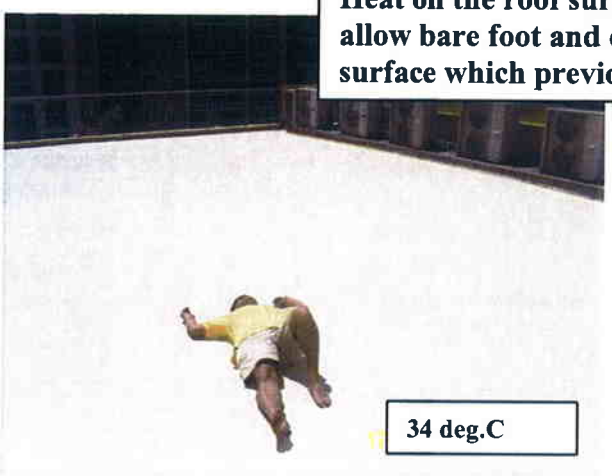
"Take The Heat Out Of Our School"







Heat on the roof surface was removed significantly that allow bare foot and even body to be in full contact on the surface which previously was not possible.



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Manual Data Matrix (Annex 1)

Data tracked and collected by the school OM (Operation Manager)

Location 1	Staff Room - Concrete Roof				
Staff Room - Concrete Roof (12pm)	Surrounding Ambient Temp at 12pm	Before Solacoat - Concrete Surface Temp	Staff Room - Concrete Roof (4pm)	Surrounding Ambient Temp at 4pm	Before Solacoat - Concrete Surface Temp
5 Jan, 2009	38 °C	44 °C	5 Jan, 2009	Rain	Rain
6 Jan, 2009	39 °C	45 °C	6 Jan, 2009	43 °C	47 °C
7 Jan, 2009	38 °C	44 °C	7 Jan, 2009	40 °C	46 °C
8 Jan, 2009	38 °C	44 °C	8 Jan, 2009	40 °C	46 °C
9 Jan, 2009	33 °C	36 °C	9 Jan, 2009	44 °C	48 °C *
Staff Room - Concrete Roof (12pm)	Surrounding Ambient Temp at 12pm	After Solacoat - Concrete Surface Temp	Staff Room - Concrete Roof (4pm)	Surrounding Ambient Temp at 4pm	After Solacoat - Concrete Surface Temp
19 Jan, 2009	38 °C	34 °C	19 Jan, 2009	50 °C	40 °C
20 Jan, 2009	44 °C	33 °C	20 Jan, 2009	49 °C	39 °C
21 Jan, 2009	41 °C	36 °C	21 Jan, 2009	46 °C	38 °C
22 Jan, 2009	41 °C	36 °C	22 Jan, 2009	36 °C	34 °C
23 Jan, 2009	35 °C	32 °C #	23 Jan, 2009	38 °C	37 °C

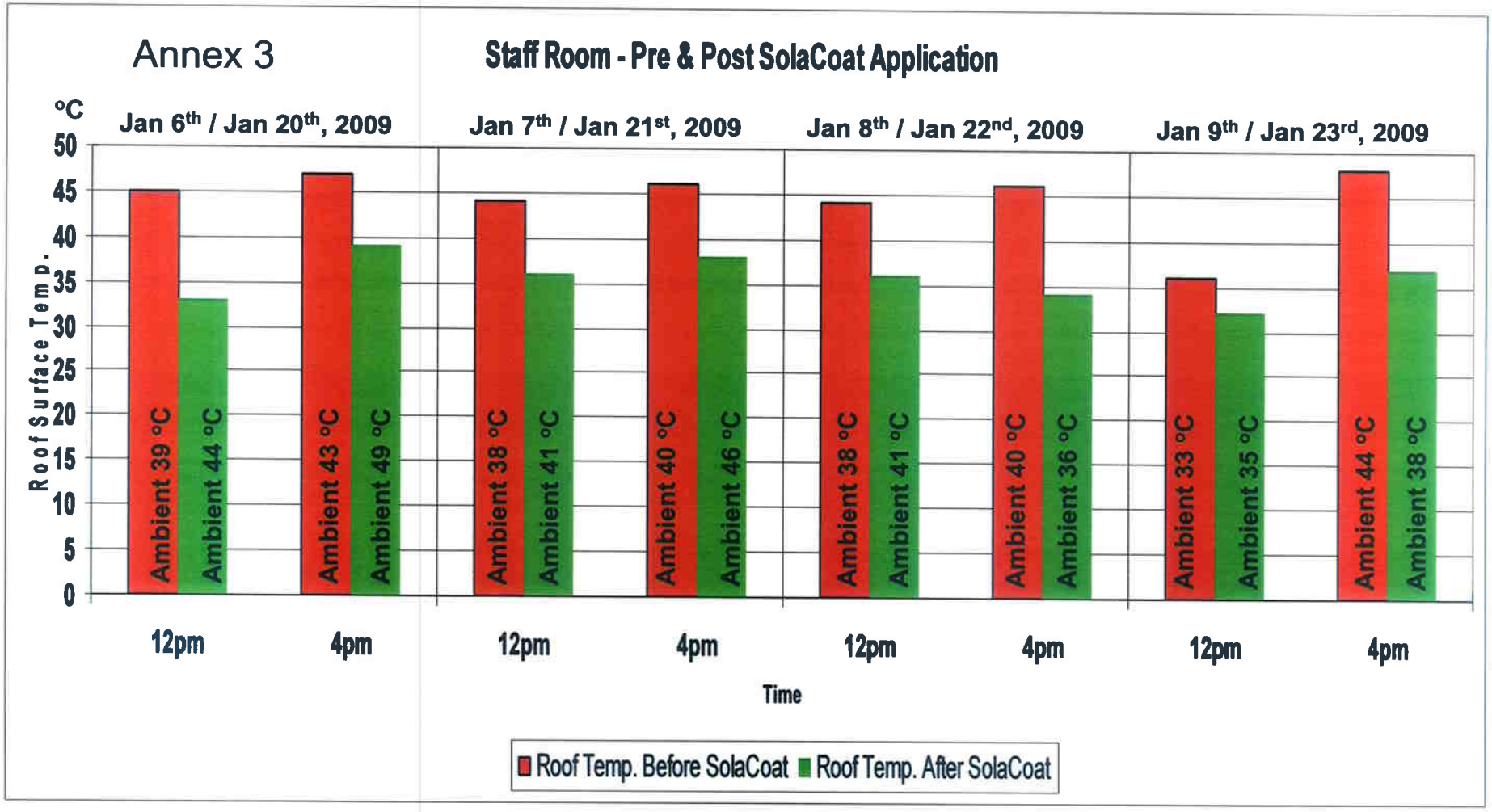
Location 2	Class Room - Metal Roof		
Class Room - Metal Roof (12pm)	Surrounding Ambient Temp at 12pm	Before Solacoat - Metat Surface Temp (Class 6.10)	After Solacoat - Metal Surface Temp (Class 6.8)
19 Jan, 2009	38 °C	62 °C	45 °C
20 Jan, 2009	44 °C	42 °C	38 °C
21 Jan, 2009	41 °C	66 °C	49 °C
22 Jan, 2009	41 °C	71 °C **	51 °C
23 Jan, 2009	35 °C	64 °C	46 °C
Class Room - Metal Roof (4pm)	Surrounding Ambient Temp at 4pm	Before Solacoat - Metat Surface Temp (Class 6.10)	After Solacoat - Metal Surface Temp (Class 6.8)
19 Jan, 2009	50 C°	48 °C	39 °C
20 Jan, 2009	49 C°	58 °C	42 °C
21 Jan, 2009	46 C°	48 °C	40 °C
22 Jan, 2009	36 C°	40 °C	35 °C ##
23 Jan, 2009	38 C°	43 °C	38 °C

Concrete roof : Highest surface temperature recorded before SolaCoat
Lowest surface temperature recorded after SolaCoat
Metal roof : Highest surface temperature recorded without SolaCoat
Lowest surface temperature recorded with SolaCoat

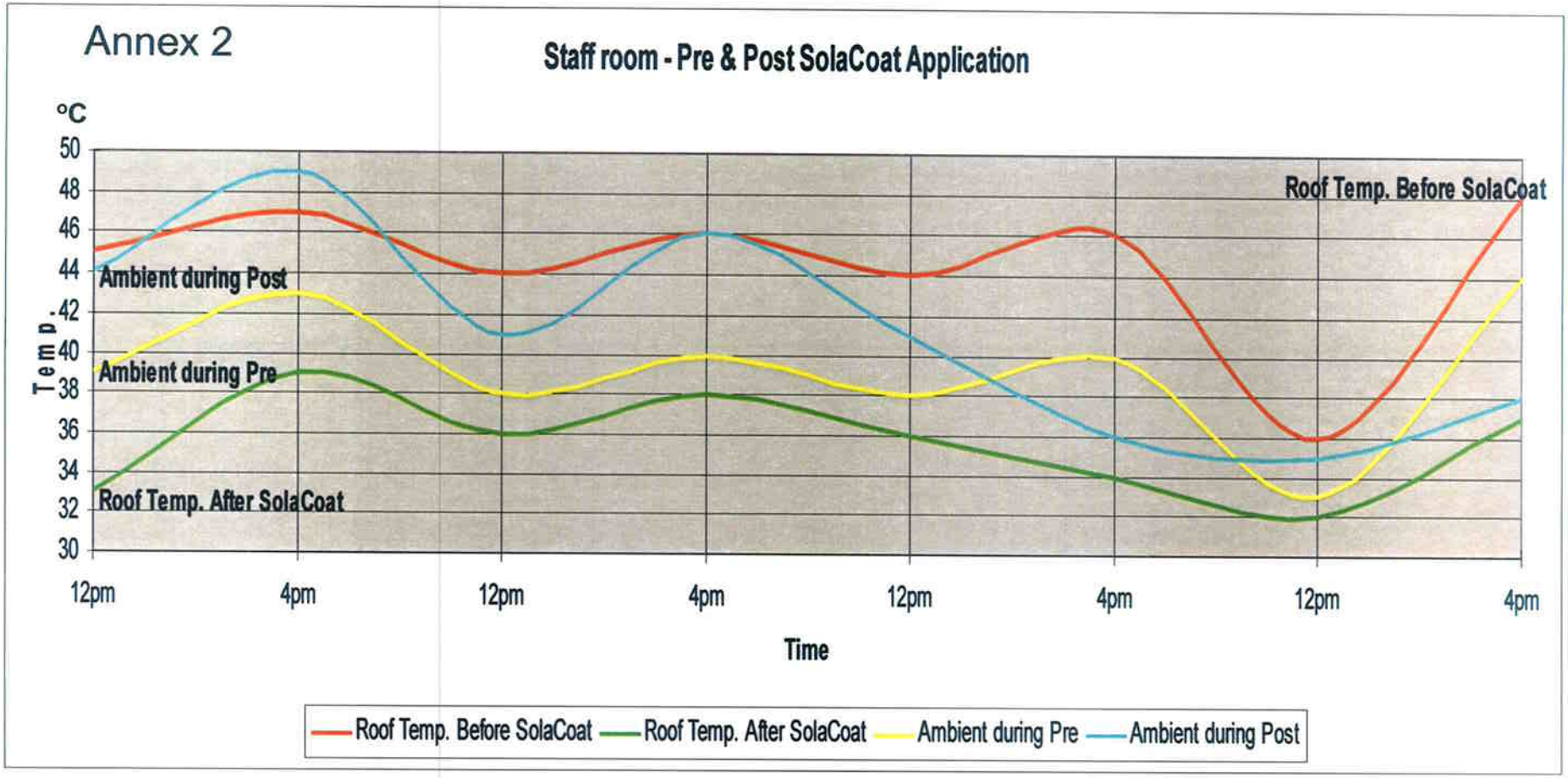
48 °C *
32 °C #
71 °C **
35 °C ##

REMARK :
Despite higher ambient temperature during the Post trial as compared to the Pre Trial period, SolaCoat coated surfaces are still much cooler than before application.

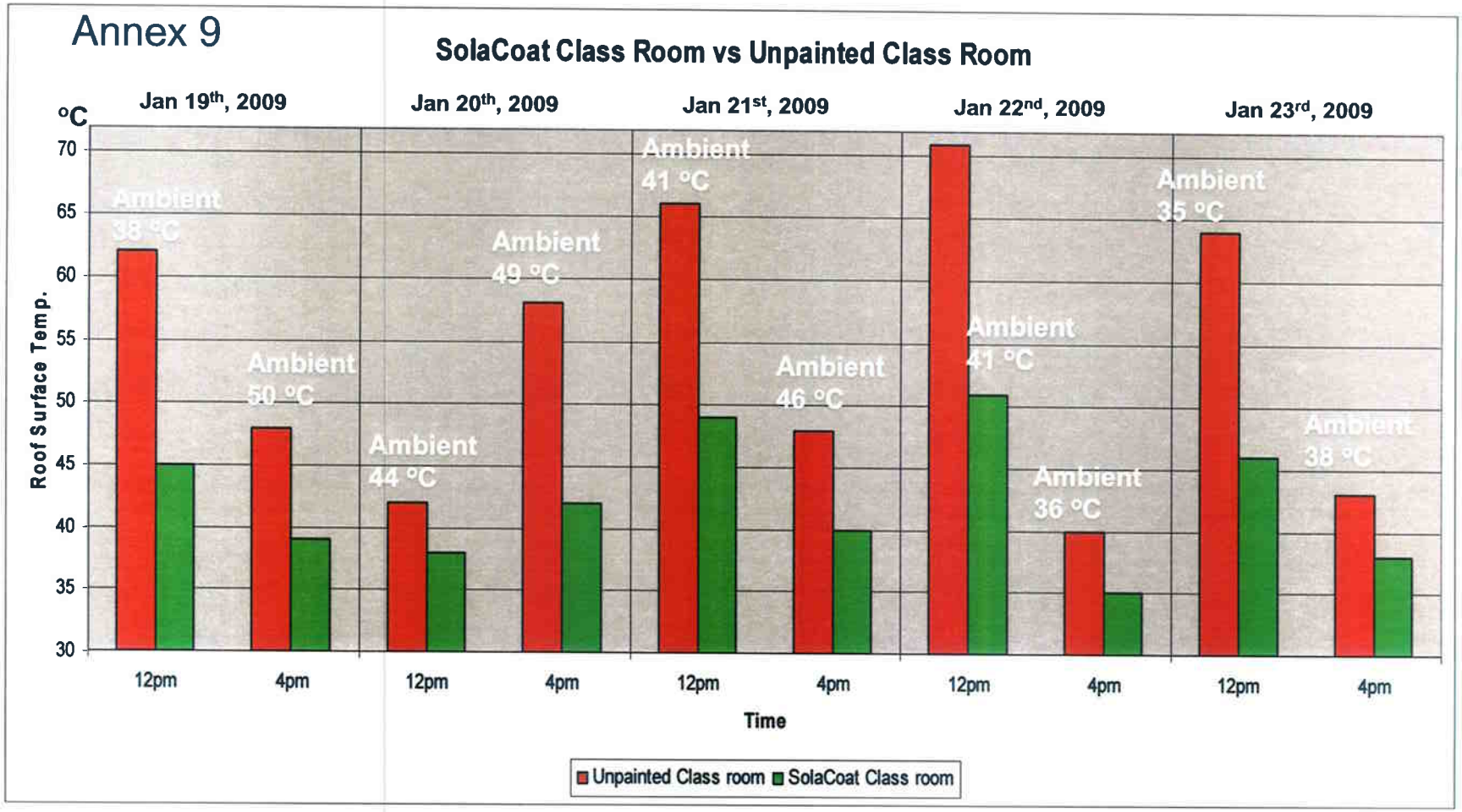
Annex 3


Staff Room - Pre & Post SolaCoat Application
°C
Roof Surface Temp.
50
45
40
35
30
25
20
15
10
5
0
Jan 6th / Jan 20th, 2009
Jan 7th / Jan 21st, 2009
Jan 8th / Jan 22nd, 2009
Jan 9th / Jan 23rd, 2009
Ambient 39 °C
Ambient 44 °C
Ambient 43 °C
Ambient 49 °C
Ambient 38 °C
Ambient 41 °C
Ambient 40 °C
Ambient 46 °C
Ambient 38 °C
Ambient 41 °C
Ambient 40 °C
Ambient 36 °C
Ambient 33 °C
Ambient 35 °C
Ambient 44 °C
Ambient 38 °C
12pm
4pm
12pm
4pm
12pm
4pm
12pm
4pm
Time
Roof Temp. Before SolaCoat
Roof Temp. After SolaCoat

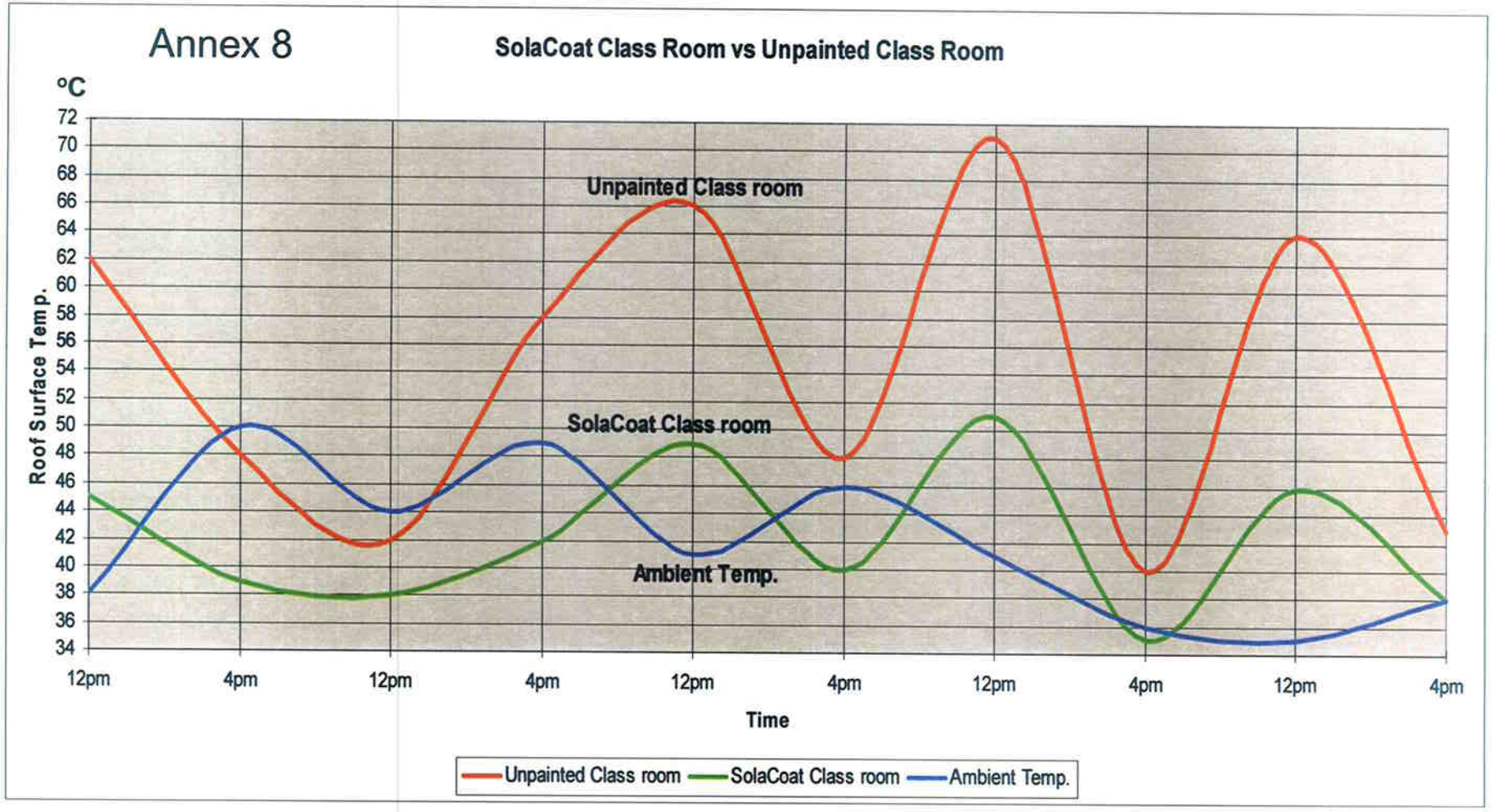
Annex 2


Staff room - Pre & Post SolaCoat Application
°C
50
48
46
44
42
40
38
36
34
32
30
Temp.
Roof Temp. Before SolaCoat
Ambient during Post
Ambient during Pre
Roof Temp. After SolaCoat
12pm
4pm
12pm
4pm
12pm
4pm
12pm
4pm
Time
Roof Temp. Before SolaCoat
Roof Temp. After SolaCoat
Ambient during Pre
Ambient during Post

Annex 9


SolaCoat Class Room vs Unpainted Class Room
Jan 19th, 2009
Jan 20th, 2009
Jan 21st, 2009
Jan 22nd, 2009
Jan 23rd, 2009
°C
70
65
60
55
50
45
40
35
30
Roof Surface Temp.
Ambient 38 °C
Ambient 50 °C
Ambient 44 °C
Ambient 49 °C
Ambient 41 °C
Ambient 46 °C
Ambient 41 °C
Ambient 36 °C
Ambient 35 °C
Ambient 38 °C
12pm
4pm
Time
Unpainted Class room
SolaCoat Class room

Annex 8


SolaCoat Class Room vs Unpainted Class Room
°C
Roof Surface Temp.
72
70
68
66
64
62
60
58
56
54
52
50
48
46
44
42
40
38
36
34
Unpainted Class room
SolaCoat Class room
Ambient Temp.
12pm
4pm
12pm
4pm
12pm
4pm
12pm
4pm
12pm
4pm
Time
Unpainted Class room
SolaCoat Class room
Ambient Temp.

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Energy Consumption Report

Location : South View Primary School

Unit : Staff Room (Air-Con Compressor)

Date : 03 FEB. 2009

Reported by : Peter Choong

1.0) Description of Measurement

Name : South View Primary School
Location : Staff Room Air-Con Compressor
Date of Report : 3rd February 09
Measured by : Peter Choong
Equipment used : Fluke 435 Power Analyzer
Description : Energy Audit

A. Measurement & Analysis Method

1. Measure with Three Phase to Neutral (415V/240 V) for the Star connected Four Wire System. (Refer to connection diagram)

2. Collection of total KW/H per day at the circuit breaker of the Air-Con compressor (Single compressor at DB 1) over a period of five days. Below shows the KW/H consumption before and after applying the paint at the roof of the staff room.

2.0) Summaries of Measurement

1. Data collected at the Single compressor at DB1

S/N	Date	Pre-SolaCoat (KW/H)	Date	Post-SolaCoat (KW/H)	% Saving (KW/H)
1	5/1/09	117.19	19/1/09	58.60	49.99
2	6/1/09	112.50	20/1/09	85.94	23.61
3	7/1/09	93.75	21/1/09	113.28	-29.83
4	8/1/09	112.50	22/1/09	109.36	2.78
5	9/1/09	112.50	23/1/09	97.66	13.19
	TOTAL	**548.44**	**TOTAL**	**464.84**	**15.24**

Note : Data are tabulated in KW/H consumption per day.

3.0) Summaries of Consumption

1) The total consumption at the single compressor collected from 5/1/09 till 9/1/09 (pre-paint) is 548.4375 KW/H

2) The total consumption at the single compressor collected from 19/1/09 till 23/1/09 (post-paint) is 464.8438 KW/H

4.0) Appendixes

Measurement Method

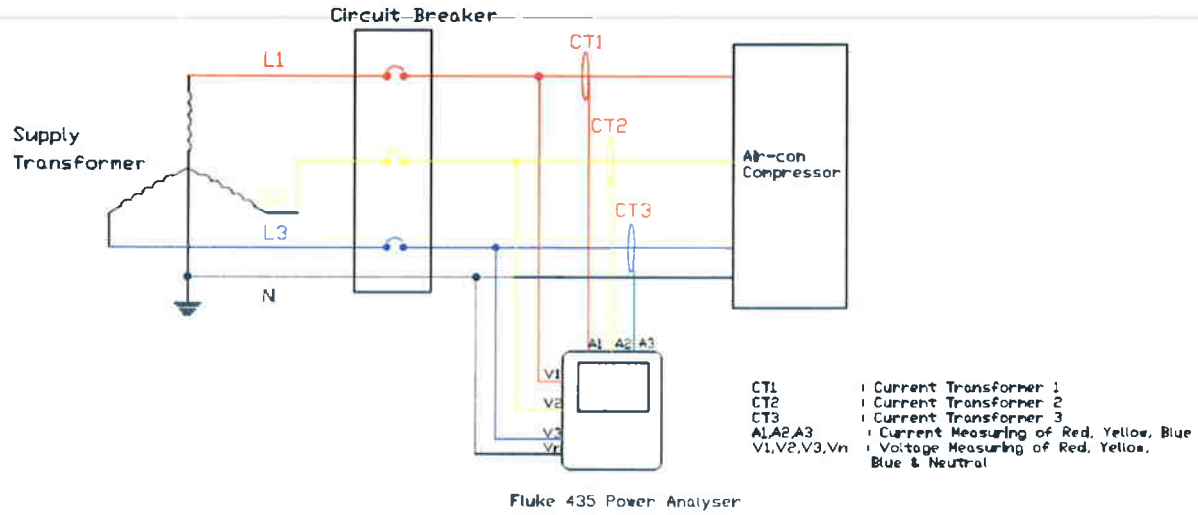
1) Connection diagram

Voltage, Current and Power Waveforms

1) Power summaries (Pre-paint) for single compressor from 5/1/09 to 9/1/09

2) Power summaries (Post-paint) for single compressor from 19/1/09 to 23/1/09

Measurement Method



Connection Diagram