



**EVALUATING THE IMPACT OF VERTICAL
GREENERY SYSTEM ON COOLING EFFECT
IN A HIGH RISE BUILDING AND
SURROUNDINGS IN PETALING JAYA**



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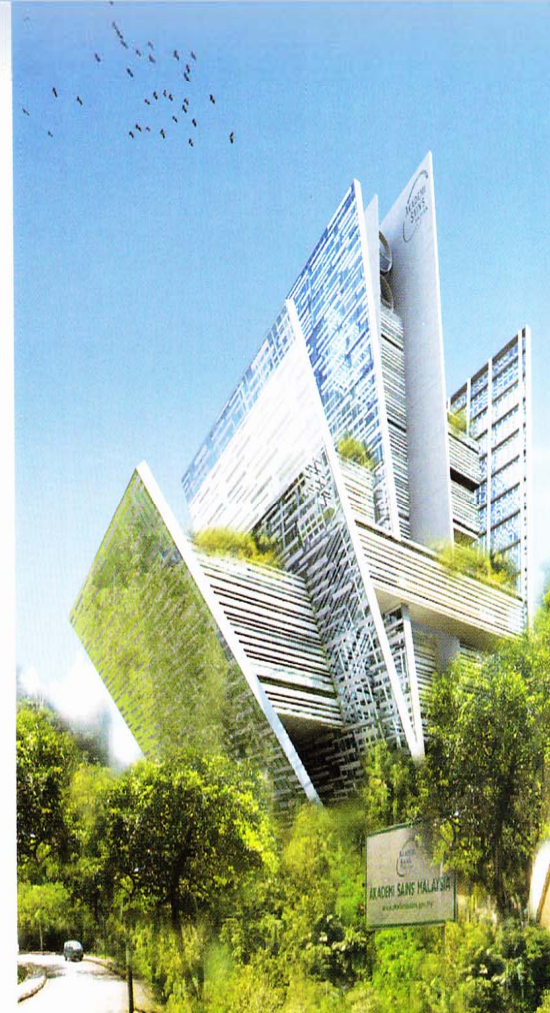


January 10, 2012



INTRODUCTION

- The rapid pace of **urbanization** and the growing concern for climate change ,
- Removal of **greenery** and replaced them with buildings and paved streets,
- Due to artificial urbanization, urban heat islands have become a **serious problem**,
- Greenery can be used as a tool for mitigating the **Urban Heat Island (UHI) effect**,
- Greening of the facade of building walls, known as **vertical greenery systems (VGSs)**, has yet to be fully explored and exploited.



RESEARCH AIM & OBJECTIVES

The **aim** of this study is to **analyse** and **assess** the influence of Vertical Greenery System (VGS) as a tool in **reducing the surface temperature of the walls** and **enhance the cooling effect of the building and its surroundings**.

The objectives of this study include :

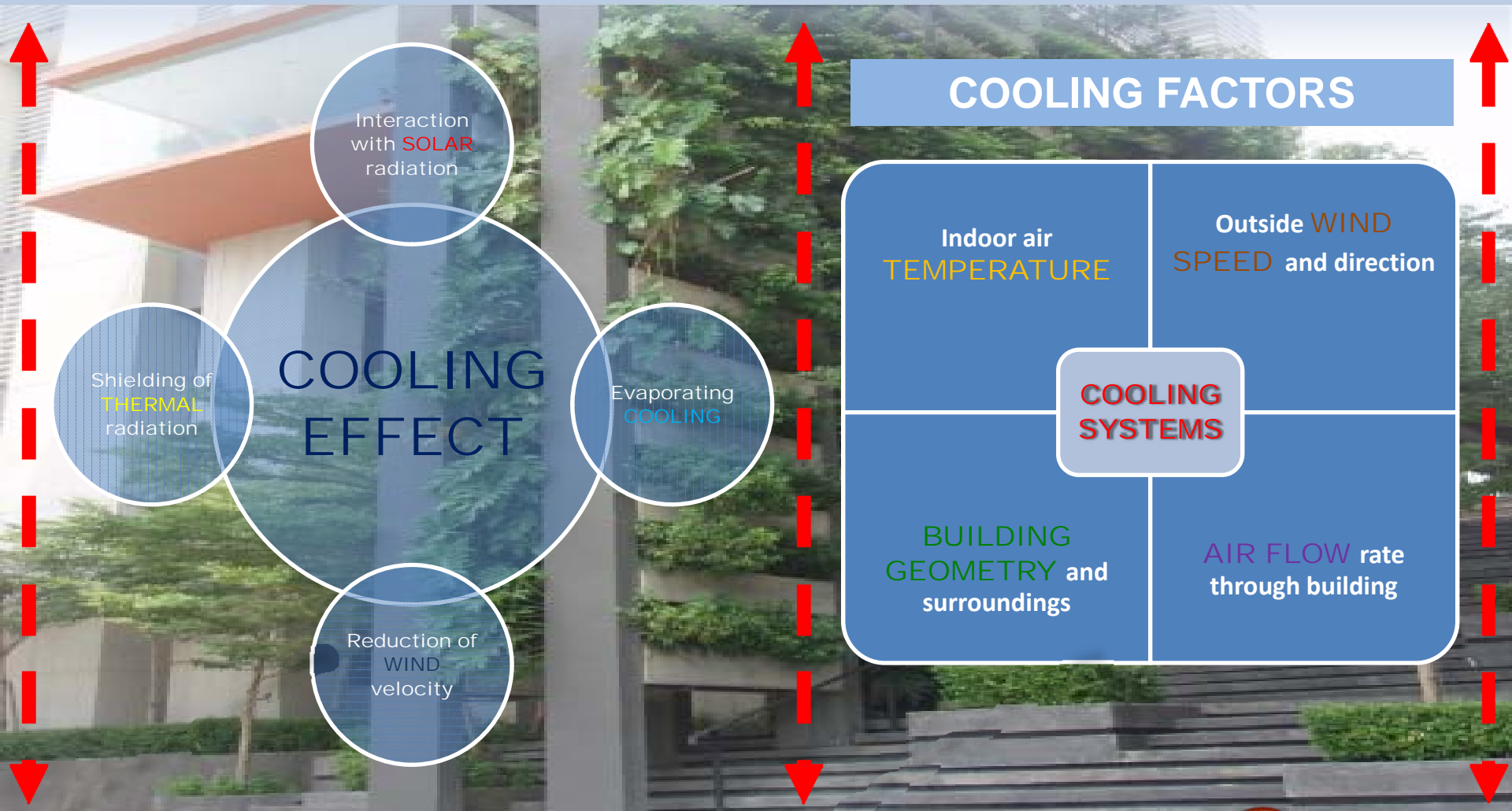
- (1) studying the effects of VGS in lowering **high temperatures** in the **wall of the building** and its surroundings, and
- (2) comparing the effectiveness of using VGS tools through **experiment** and **simulation** to reduce the UHI effect.

Scope of study :

Related to the **cooling effect** of the **building** and the environment by using a VGS. **Limitation of the study** covers only the **parameter effects** on the **microclimate** of the building and study the **effect of cooling technology**. It **does not involve** the study of materials and structures.



ELEMENTS OF COOLING



THEORETICAL FRAMEWORK

- ✓ Research work is based on the results of the experiments, simulations and data collection. This study will use a **quantitative approach**.
- ✓ This study is a combination of **experimental data** and work to **collect data** in the field.
- ✓ Results of experiments and data collected will be used as a source of **design simulation models**.
- ✓ Data obtained from the **materials** and **methods** used to evaluate and predict the performance of the system resources and green vertical.
- ✓ This study will depend on **three levels**.
 - **First**, the characteristics that affect the urban heat island (UHI) and the effectiveness of surface cooling in the building and its surroundings.
 - **Second**, on-site data collection as a guide for the study.
 - **Third**, the use of equipment such as GIS and Envi-met in this study.



RESEARCH DESIGN

Literature Review

Vertical Greenery System (VGS)

Research Methodology

Experimental (PJ8)

Simulation (Section 13)

Data Collection

Temperature

Humidity

Wind speed

Leaf Area Density (LAD)

GIS

Data Analysis

Variables

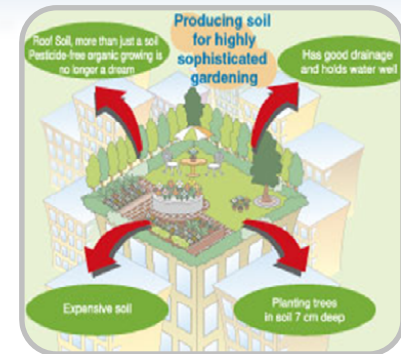
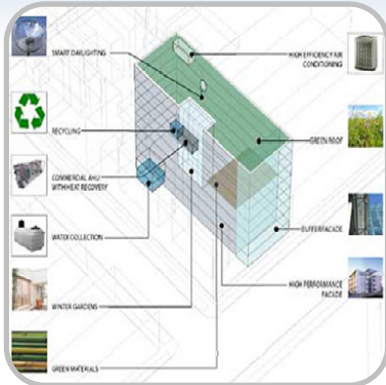
Envi-Mat

Model

Result and Finding

Cooling Effect

RESEARCH DESIGN



Independent Variables

- Temperature
- Humidity
- Wind speed
- Leaf Area Density(LAD)



Dependent Variables

- Cooling Effect (Experimental)
- Cooling Effect (Simulation)

Research Aim

- The purpose of this study is to analyse and assess the influence of Vertical Greenery System as a tool in reducing the surface temperature of the walls and enhance the cooling effect of the building and its surroundings.

RESEARCH PARAMETERS

PARAMETERS	DATA TO BE MEASURED	EQUIPMENTS	
Temperature	<ul style="list-style-type: none"> - Thermal radiation - Heat absorption - Lands Surface Temperature (LST) 	WatchDog 2900ET Weather Station (Standard Features)	 <p>WatchDog Model 2900ET Weather Station</p>
Moisture	<ul style="list-style-type: none"> - Wet area - Dry area - Rainfall collection 		
Wind speed	<ul style="list-style-type: none"> - Air flow - Direction - Building structure 		
Leaf Area Density (LAD)	<ul style="list-style-type: none"> - Green coverage - Thickness of plant - Leaf Area Index (LAI) 	LI-COR (USA) Plant Canopy Analyzer Calculation (LAI 2000)	

SCHEDULE OF WORK

RESEARCH TIMELINE	SEMESTER 1 – 2011/2012																							REMARKS	
	12 September – 2 December 2011												5 December – 2 March 2012												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
PHASE – 1 : PRE-PREPARATION																									
▪ Obtain the necessary equipment for data collection on site																									Pending approval UTM Procurement (29.11.11)
▪ Determine the appropriate location for the installation of equipment on site																									Topographic data and satellite images have been obtained from MACRES. (20.09.11)
▪ Set the number of focal points for taking data on site																									
▪ Provide a standard operating procedure for reference at the site																									Still in the process of discussions with building owners PJ8 (IJM)
▪ Provide the forms to record information and data on site																									Still in discussion with the supervisor and PJ8 (IJM)
PHASE – 2 : DURING DATA ACQUISITION																									
▪ Provide on-site data collection schedule																									Still in discussion with the supervisor and PJ8 (IJM)
▪ Recording of all data collected on site & relevant agency																									Rainfall data Meteorological Dept. (Year 2010 and 2011) (23.11.11)
▪ Monitoring the safety and care of equipment on site																									Monitoring and provision of equipment on site will be implemented after it is obtained from Procurement Unit, UTM.
▪ Ensure the maintenance done on the equipment on site																									Training will be held after the equipment is obtained from UTM
▪ Obtain advice on training and equipment on site																									
PHASE – 3 : POST DATA ACQUISITION																									
▪ Ensure that all data obtained in accordance with specified parameters																									Data collection will begin after all equipment is available from the Procurement Unit, UTM. Data collection time period required for 6 months.
▪ Collect all forms and records of data used																									
▪ Clearing all equipment installed on site																									
▪ Check all of the data obtained complete and meet the requirements of the study																									
▪ Analyze all data obtained in preliminary																									

ACTIVITIES

Semester 2 – 2011/2012



SENVAR 2011 – Surabaya, Indonesia (10 – 11 November 2011)



Academic visit to Centre for Sustainable Asian Cities (CSAC), NUS, Singapore (17 November 2011)