

# Retrofit Tool

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EAEF Project 64

23 March 2006, Kuala Lumpur

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# Objectives of Retrofit Tool

- Reliable identification of economically feasible retrofitting works
- Standardized assessment procedure for easier granting of retrofit loans

Collect and input  
building data



Retrofit Tool:  
Analysis & Retrofit  
Report



Bank:  
Retrofit Report  
evaluation

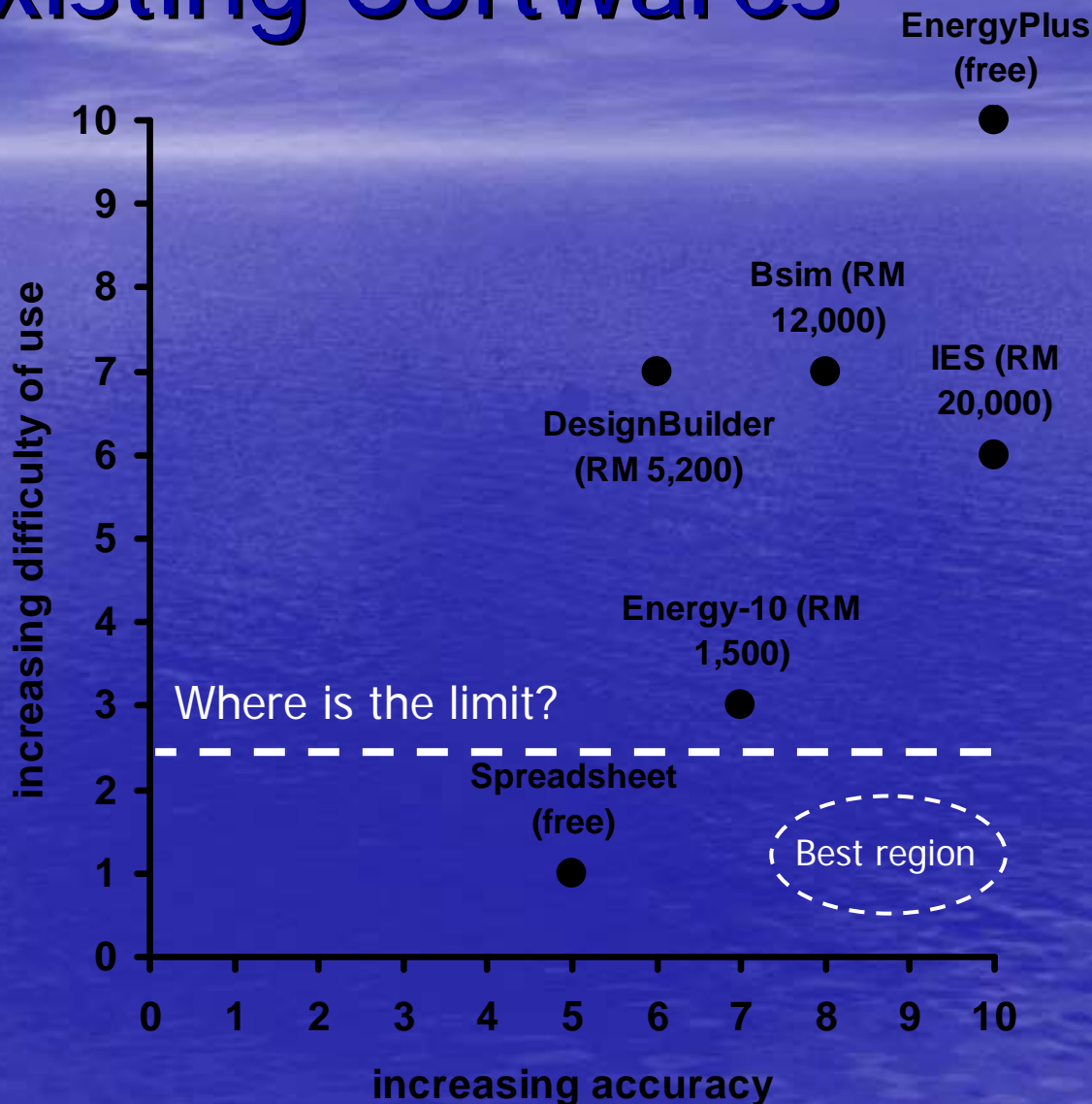


Retrofit  
loan  
granted

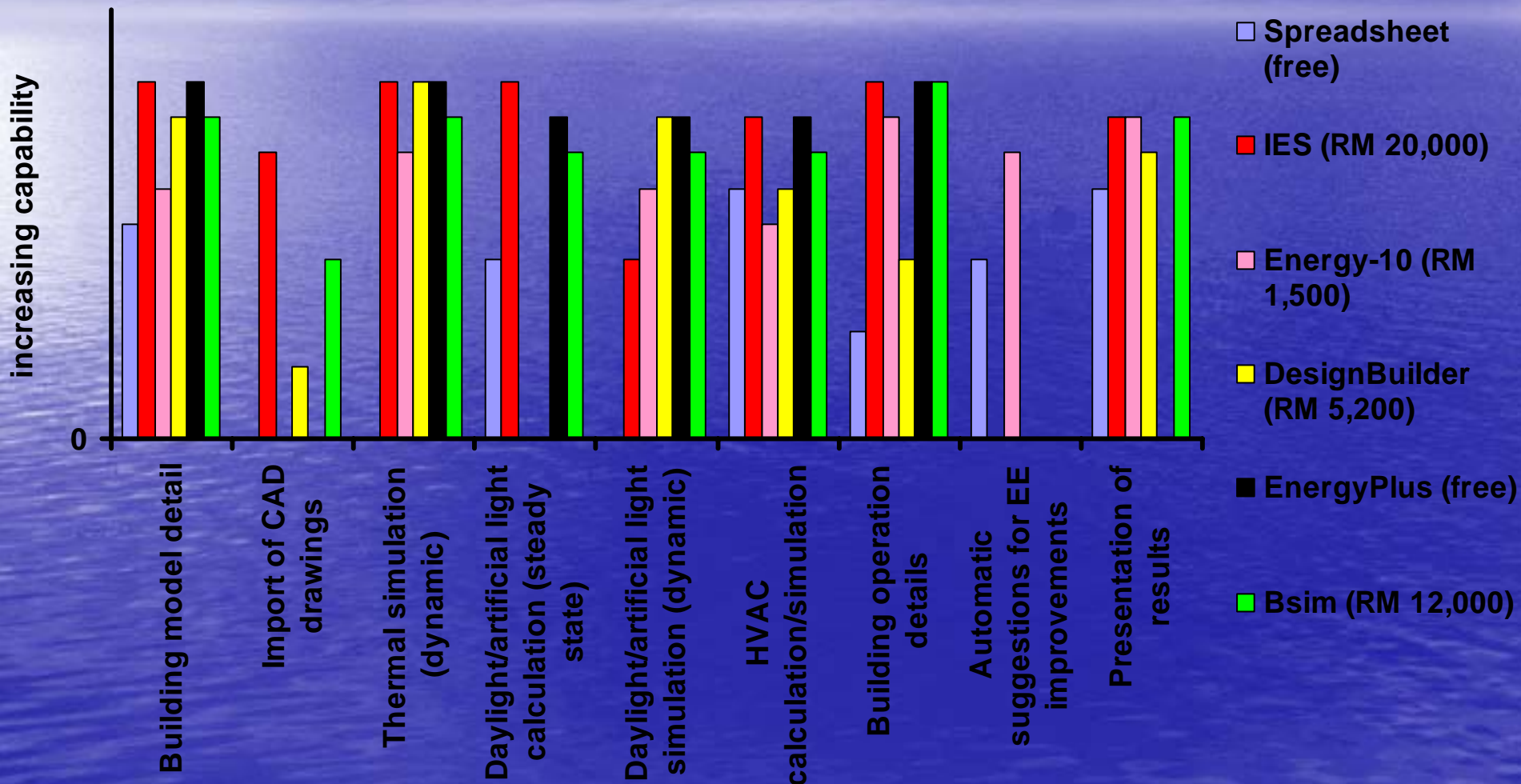


# Review of Existing Softwares

- Building simulation softwares
- Annual evaluation of major energy flows in buildings



# Software Evaluation Criterion



# Detailed Simulation Softwares

## PROS:

- More building detail
- Higher accuracy through annual simulation
- Detailed daylighting retrofit analysis
- Dimensioning of HVAC

## CONS:

- Input too difficult
- Input too time-consuming
- Junk in junk out
- Expensive



# Simple Software (spreadsheet)

## PROS:

- Easy to use
- Quick
- Tailor made
- Input errors less likely
- Free

## CONS:

- No annual simulation
- Less accurate
- Daylight analysis through estimation



# Retrofit Tool Overview

## (preliminary version)

- Spreadsheet

- Inputs

- a) Energy bills & Electricity prices
- b) Building physical data & usage
- c) Major energy consumptions split-up

} Warning message, if input seem improbable

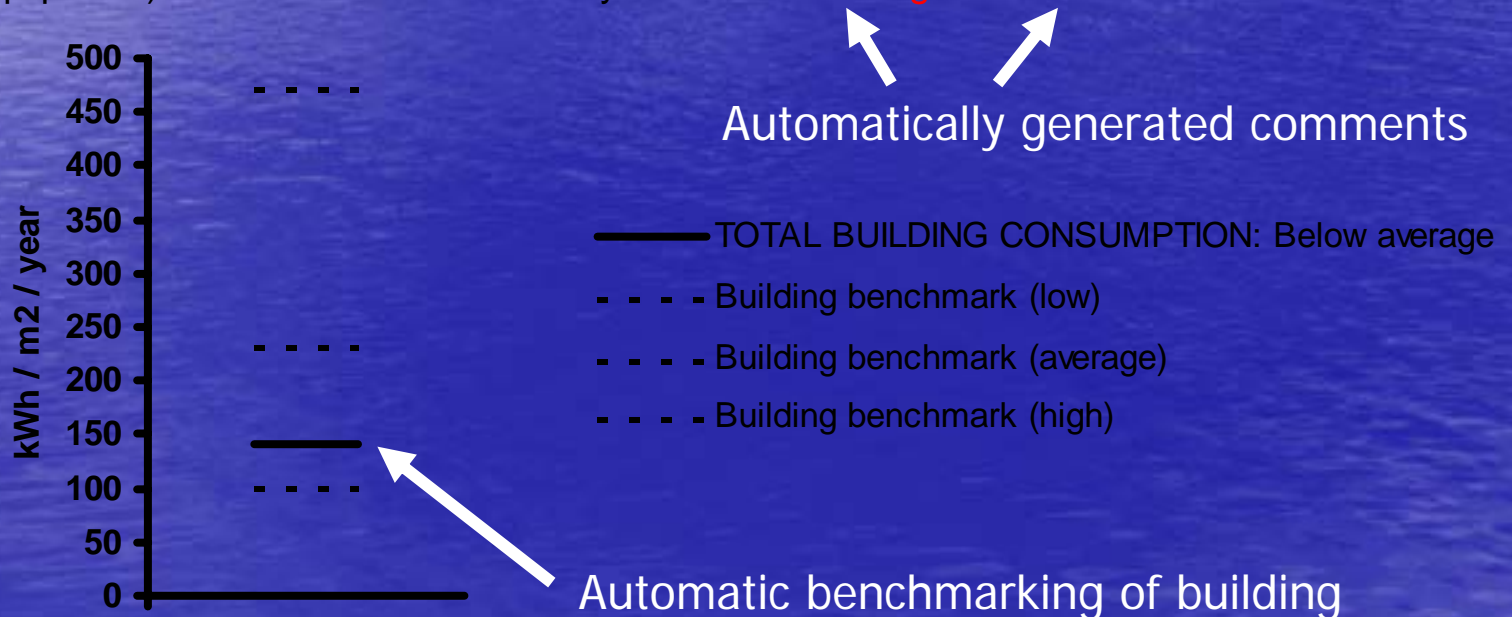
- Outputs

- a) Identification of promising retrofit areas
- b) Standardised Retrofit Report

↘ Warning message, if savings seem improbable

# Retrofit Tool: Evaluation of building input

			<b>Benchmark</b>	<b>Comments</b>
Total electricity consumption	140	kWh/m <sup>2</sup> /year	Below average	Exceeding EE guidelines 1989
Air-conditioning	70	kWh/m <sup>2</sup> /year	Below average	
Ventilation (transport of air)	20	kWh/m <sup>2</sup> /year	Very high	
Lighting	23	kWh/m <sup>2</sup> /year	Below average	OK (fulfills MS1525)
Lifts & Escalators	2	kWh/m <sup>2</sup> /year	Very low	
Plug loads (office equipment)	26	kWh/m <sup>2</sup> /year	Below average	



# Retrofit Tool: Example of Retrofit Report

No. Retrofit	Savings (kWh/year)	Savings (RM/year)	BEI reduction (%)	Investment (RM)	Payback (years)	Notes
1 EE Lighting	70,549	17,637	5.0%	112,000	6.4	A (ok)
2 Window film	3,345	836	0.2%	11,000	13.2	C (Film price set too low)
3 EE Chiller	112,034	28,009	8.0%	150,000	5.4	B (New COP optimistic, but not unrealistic)
4 EE exit signs	578	145	0.0%	1,700	11.8	A (ok)
<b>Total</b>	<b>186,506</b>	<b>46,627</b>	<b>13.3%</b>			



Automatically generated evaluation messages

A: Retrofit measure looks fine

B: Retrofit measure looks optimistic/questionable

C: Retrofit measure look unrealistic

# Discussion with audience

## TOPICS:

- Simulation tool vs. Spreadsheet
- Max. Cost
- Features
- Other

# Thank You!

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